A Regional Review of Social Safety Net Approaches
In Support of Energy Sector Reform

Appendix 3:

Energy Reform and Social Protection in Bulgaria

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Acronyms

BGL	Bulgarian *leva*
CEE	Central and Eastern Europe
CFL	Compact fluorescent lamp
CHP	Combined heat and power
CuEE	Currency equivalence of electricity
DKER	Bulgarian language acronym for SERC
DMI	Differentiated minimum income
DSM	Demand-side management
EEEA	Energy and Energy Efficiency Act
EBRD	European Bank for Reconstruction and Development
ESCO	Energy service company
EU	European Union
FDMI	Family differential monthly income
FMI	Family monthly income
GDP	Gross Domestic Product
GEF	Global Environment Facility
GMI	Guaranteed minimum income
HCA	Heat cost allocator
IEA	International Energy Agency
JIU	Joint Implementation Unit
KIDSF	Kozloduy International Decommissioning Support Fund
KWh	Kilowatt hour
UBB	United Bulgarian Bank
MEER	Ministry of Energy and Energy Resources
MLSP	Ministry of Labor and Social Policy
MoEW	Ministry of Environment and Water
MOF	Ministry of Finance
Mtoe	Metric tons of oil equivalent
MWh	Megawatt hour
NEK	National Electric Company
NGO	Non-Governmental Organization
NSAS	National Social Assistance Service
OECD	Organization for Economic Cooperation and Development
PAL	Programmatic Adjustment Loan
SEEA	State Energy Efficiency Agency
SERC	State Energy Regulatory Commission
SOFENA	Sofia Energy Agency
TJ	Terajoules
TRV	Thermostatic radiator valve
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WSP	Winter Supplement Program

Preface

This report is one of five country reports and a synthesis report that were produced under the United States Agency for International Development (USAID)-sponsored project, Regional Review of Social Safety Net Approaches in Support of Energy-Sector Reform, as described below:

Abstract

The energy sector reform process is occurring throughout the transition countries of Central and Eastern Europe (CEE) and Eurasia. The United States Agency for International Development (USAID) has supported this process in numerous countries. The electricity sector reform process involves establishing a modern legal and regulatory framework, unbundling the monopoly electric utility into separate generation, transmission and distribution companies, and creating a competitive electricity market and privatization. This process is leading to the introduction of transparent commercial operations, modern technology, and investment that is needed to provide reliable and economic service for the long run. The transition to this end goal includes increasing tariffs and the collection enforcement for the supplied electricity.

During the transition there will be some impact on vulnerable populations. To identify approaches that will ease the impact on these populations, a multi-country study was conducted to identify social safety net approaches in support of energy-sector reform. This report documents this activity's results. The study identifies and documents lessons learned and best practices to ease the transition impact of power sector reform.

The three approaches to helping low-income households afford energy are contrasted and compared. The approaches are: 1) subsidies and assistance payments; 2) energy-efficiency mechanisms; and 3) tariffs. Each mechanism's impact is analyzed using a matrix that compares a range of quantifiable evaluation criteria.

The country reports (appendices) review the mechanisms that Armenia, Bulgaria, Hungary, Kazakhstan and Romania have used.

The results are available for government policymakers, international financial institutions, donors, and others interested in power sector reform and addressing the needs of vulnerable populations.

Executive Summary

The energy sector is going through a reform process in Bulgaria, with a potentially strong impact on vulnerable groups. While supporting the reform process, the United States Agency for International Development (USAID) commissioned a multi-country study in Central and Eastern Europe and Eurasia, including Bulgaria, to identify social safety net approaches that will ease the transition impact on vulnerable populations. This report focuses on Bulgaria and analyzes the state of energy sector reform in Bulgaria, the relation between energy and poverty, and the three approaches available to the government of Bulgaria—social tariffs, heating assistance payments, and household energy efficiency—to assist low-income households with their energy costs. A restructuring of energy assistance can and should occur concurrently with overall sector restructuring to help reduce the impact of power sector reform on low-income families.

It is a matter of national policy in Bulgaria to assist low-income citizens with their energy expenses, which are increasing as a result of reform-oriented tariff increases. *The 1999 Energy and Energy Efficiency Act* states that the development of a domestic energy market in Bulgaria will be accompanied by parallel measures for social protection and social guarantees. However, Bulgaria has had a mixed record in providing these social guarantees since the policy was adopted. A temporary social tariff for electricity was established in July 2002, but there is disagreement over whether it is generous enough. Many low-income households, particularly those outside of Sofia, have not always received the assistance that they are entitled to. Of those who do receive their entitlement, many find it insignificant compared to the cost of meeting basic energy needs. In 1999, an agency was established to focus solely on energy efficiency, but there is no low-income energy-efficiency program in place or planned.

In general, Bulgaria has a large, though under-funded, social safety net. Social transfers constitute a large component of both GDP and government spending. In 1998, they amounted to 11 percent of GDP and reached 12.3 percent in 1999.[1] However, according to a 1999 World Bank review of Bulgaria's social assistance, the new structure is inadequate because the "guaranteed minimum income" (GMI), the basis for determining the size of assistance payments, is set too low and is raised infrequently.[2] Everyone eligible for social assistance is automatically eligible for help in paying their heating bills under the Winter Supplement Program (WSP), although the pool of people receiving heat assistance payments is bigger than the pool receiving social assistance payments. Furthermore, according to the Bank, the quality and impact of social assistance are questionable. One requirement for Bulgaria's accession to the European Union (EU) is that it must combat poverty. The EU has repeatedly expressed concern

[1] The World Bank, Poverty Reduction and Economic Management Unit, Europe and Central Asia Region, "Bulgaria: The Dual Challenge of Transition and Accession" (Washington, D.C., February 2001), 87.

[2] United Nations Development Programme and USAID Open Society Foundation, "Early Warning Report – 2001 Bulgaria, UNDP Project BUL/99/021"(2001), 90.

about the lack of progress in enacting reforms in social programs aimed at alleviating poverty.

Compared to its neighbors, Bulgaria's transition to a market economy has been marked by high inflation, reduced economic output, plunging GDP, and a consequent contraction in living standards. The restructuring of Bulgaria's energy sector necessarily involves raising residential energy prices to market levels, which could cause households to default on payments, increase arrears to utilities, or lead to increased disconnection rates, further damaging the economy.

Currently, the three approaches for assisting low-income households with their energy costs are the responsibilities of three different agencies. The energy regulatory agency (SERC) is in charge of tariffs; the Ministry of Labor and Social Policy (MLSP) is in charge of the Winter Supplement Program; and the State Energy Efficiency Agency (SEEA) within Ministry of Energy and Energy Resources (MEER) is in charge of energy efficiency. Yet, helping low-income households in an administratively efficient manner must involve coordination among these three agencies. At a minimum, an inter-agency task force is needed to coordinate the efforts of the three agencies. The MEER does not yet have an energy-efficiency program that targets low-income households, but the task force would help set the stage for such a program, helping the agency appraise such concerns as eligibility, targeting, and supervision that have already been faced by the Winter Supplement Program.

Of the three approaches used to assist low-income families, energy efficiency may be the most equitable and cost-efficient approach. Bulgaria should establish a low-income energy-efficiency program. The program should be coordinated with the social tariffs and fuel assistance payments, which can be reduced over time as the energy-efficiency improvements reduce low-income household costs. It can be financed through a variety of measures including: budget transfers, a surcharge on energy sales, dedicated funds, and utility-sponsored and demand-side management (DSM) programs. In addition, foreign carbon investors could help support energy-efficiency investments in exchange for which the investors would take title to the carbon emission reductions. Establishing energy service companies (ESCOs), which have been successful in Bulgaria and other countries in addressing energy efficiency in institutional buildings and, to a lesser extent, in industrial facilities, is another option. Once Bulgaria closes four nuclear reactors (two of them are already closed), the EU and other donors will capitalize the "Kidsfund," a grant fund to be used by Bulgaria for nuclear plant decommissioning and related activities, as well as for improvements in energy efficiency. The proceeds could be used to support energy efficiency.
It is also recommended that the government improve the WSP by increasing the payment amount and improving the WSP reporting and accounting systems to ensure that only targeted households are reached. Improvements are also needed in the design and application of Bulgaria's social tariff. Finally, expanding low-pressure natural gas networks and rehabilitating district heating systems could offer a more efficient, less expensive heating alternative to electricity.

Chapter 1
Energy Social Safety Net Approaches in Bulgaria

A. Introduction

It is a matter of national policy in Bulgaria to assist low-income citizens with their energy expenses. *The 1999 Energy and Energy Efficiency Act* states that the development of a domestic energy market in Bulgaria will be accompanied with parallel measures for social protection and social guarantees that will:

- Ensure price-affordable energy for every Bulgarian citizen by streamlining the social aid arrangement during the heating season;
- Establish new forms of social aid including social tariffs for limited basic quantities;
- Facilitate access of the population to more economic forms of heating; and
- Mitigate the negative effects of restructuring and higher prices by improving efficiency of energy supply (lower costs) and of demand (lower bills).[3]

Bulgaria has a mixed record in providing these social guarantees since the policy was adopted in 1999. A temporary social tariff for electricity was established in July 2002, but there is disagreement over whether it is generous enough to low-income households. Assistance for paying heating bills has increased since its inception in 1996, but many low-income households, particularly those outside of Sofia, do not receive the assistance that they are entitled to. Of those who do receive their entitlement, many find it insignificant compared to the cost of meeting their basic energy needs, even when combined with the social tariff for electricity. In 1999, an agency was established to focus solely on energy efficiency, but there is no low-income energy-efficiency program in place or under preparation.

B. Social Assistance Overview

Bulgaria has a large, though under-funded, social safety net. Social transfers constitute a large component of both GDP and government spending. In 1998, they amounted to 11 percent of GDP and reached 12.3 percent in 1999.[4] As a percent of government spending, social transfers have risen from 21 percent in 1996 to 33 percent in 2001 and are projected to rise to 35 percent in 2002.[5] Somewhere between five to nine percent of all social spending currently goes for social assistance to the poor.[6]

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[3]Bulgarian Ministry of Energy and Energy Resources, *Energy and Energy Efficiency Act of 1999*, as cited in the "Concept Paper on the Bulgaria National Energy Strategy," 2002.

[4] The World Bank, Poverty Reduction and Economic Management Unit, Europe and Central Asia Region, "Bulgaria: The Dual Challenge of Transition and Accession" (Washington, D.C., February 2001), 87.

[5] The World Bank: Poverty Reduction and Economic Management Unit, Europe and Central Asia Department, "Bulgaria: Public Expenditure Issues and Directions for Reform - A Public Expenditure and Institutional Review, Report No. 23979-BUL" (Washington, D.C., August 2002), 123.

[6] Michael Cain, interview by the author, from 1997 World Bank survey data, August 2003.

Pensions represent the largest category of social protection expenditures, accounting for 55 percent of social spending; social assistance payments to the poorest households are a distant second; they are known as the "guaranteed minimum income" (GMI) program, plus household benefits such as child allowances and maternity leave, followed by unemployment compensation and other labor market programs.

The 1998 Social Welfare Act and accompanying regulations structured the overall institutional framework for social assistance, consolidated a number of social assistance programs, and sought to improve their targeting to households with many children, the elderly, and the disabled. However, according to a 1999 World Bank review of Bulgaria's social assistance, the new structure is inadequate because the GMI is set too low and is raised infrequently.[7]

Furthermore, according to the Bank, the quality and impact of social assistance are questionable. The Bank review cited 1997 household survey data, which indicated that coverage was low, with only 10 percent of poor households receiving the benefit.[8] This is largely due to poor targeting, as over one-third of households received various forms of social assistance and 58 percent of those receiving child allowances were not poor before the receipt of the benefit. Of those who do receive social assistance, the assistance is a relatively small share of total household expenditures. Thus, according to the Bank, social assistance has a relatively small impact on poverty.[9] However, some recent studies suggest that the targeting situation is better than earlier studies indicated. The recent studies reflect improved macroeconomic conditions and use alternative approaches to measuring how well social assistance is targeted.[10]

Although improving targeting is important, it tends to be less important in those provinces that have large amounts of poverty and thus large proportions of households that qualify for social assistance. Even many of the non-poor households that receive assistance in these provinces are quite close to the poverty line. This may be acceptable program leakage given that Bulgaria's poverty line is exceptionally low by regional standards.

One of the requirements for Bulgaria's accession to the European Union (EU) is that it must combat poverty. To this end, Bulgaria reports that it is taking the following steps:

- Improving the existing legislation in the social aid area and securing an efficient mechanism of financing the system of social aid;
- Adopting a national action plan to reduce poverty in Bulgaria;

[7] United Nations Development Programme and USAID Open Society Foundation," Early Warning Report – 2001 Bulgaria, UNDP Project BUL/99/021" (New York, 2001), 90.

[8] "Bulgaria: The Dual Challenge," p. 92.

[9] The World Bank, Human Development Sector Unit, Europe and Central Asia Region, "Bulgaria, Poverty During the Transition Report, Report No. 18411" (Washington, D.C., June 7, 1999).

[10] For example, results depend on whether targeting effectiveness is based on individuals or households. If calculated via household and the benefit received by the household is subtracted, then 78.5% of the poor *ex ante* received social assistance versus 53% of the non-poor households (Carletto and Fujii, p. 25).

- Improving the living conditions of children and creating conditions for the upbringing of children in the household environment;
- Creating better living conditions for people with disabilities by creating the necessary preconditions for social rehabilitation and employment, and ensuring an accessible social, cultural and labor environment;
- Developing a national strategy for disabled persons; and
- Restructuring the social services system.[11]

The EU has repeatedly expressed concern about the lack of progress in enacting reforms in social programs aimed at alleviating poverty. In its *Opinion of July 1997*, the European Commission underlined the lack of reforms in the social system and also called for an improvement in the social dialogue. There was a low level of compatibility between Bulgarian legislation and the Community rules, and the application did not always conform to Community practices. The November 1998 Report confirmed this initial assessment. Poverty remained widespread and the general health situation required additional action. The October 1999 Report once again noted the problem of poverty and stressed the need to devote additional resources to health. Bulgaria was encouraged to pursue its efforts, especially to bring its legislation on health and safety at work into line with Community rules and to strengthen its institutions. Scant progress was noted in the November 2000 Report, which found that poverty continues to affect the whole country, and the high unemployment rate and social security deficits are exacerbating this problem.[12]

C. Social Safety Net Design and Operation

The Ministry of Labor and Social Policy (MLSP) manages social assistance for the poor. While there is no official poverty line in Bulgaria, the MLSP sets benefit levels for social assistance payments on the basis of the "guaranteed minimum income."[13] In 2001, the GMI was set at 40 Bulgarian *leva* (BGL) (or $18.26) per month. If a person lives alone and has no income, he/she is paid at the 40 BGL level. If a person has some income, the government pays the difference between that income and 40 BGL. Benefits increase according to age, disability, and family size (see appendix 2 for the benefits table). The basic 40 BGL payment is equivalent to about $0.61 per day, making it extremely difficult to survive on. The World Bank's poverty line is $1.00 per day. The minimum social pension is 44 BGL per month ($20.09), so pensioners do not receive anything under the GMI program.

As of the first quarter of 2002, there were 3,331 families receiving social assistance in Sofia. In all of Bulgaria, there are 173,036 families, of which 128,269 are unemployed. The total government payout for social assistance in 2001 was 196.1 million BGL

[11] European Union, "Pre-Accession Economic Programme: Bulgaria" (Brussels, May 2001), sec. 4.5.1.

[12] European Union, "Bulgaria – Adoption of the Community Acquis – Social Policy," 2001, available on the Internet at: http://europa.eu.int/scadplus/leg/en/lvb/e02101.htm.

[13] The MLSP's National Office for Social Support is coordinating research to establish an official poverty line.

($95.19 million) under article 9 of the *Regulation of Social Assistance* and 92.3 million BGL under article 15 for the Winter Supplement Program (WSP), Bulgaria's heating assistance program. There are 940,512 families that are social assistance beneficiaries.[14]

Some payments to disadvantaged groups are not income dependent. As of the first quarter of 2002, there were 206,079 disadvantaged people receiving social assistance. Of these, 137,318 were physically disabled people. Some of these individuals receive 8 BGL/month ($3.88) allowance for telephone and some receive 6 BGL/month as a transport allowance.[15]

As of the first quarter of 2002, there were 3,331 families (including single people) receiving social assistance in Sofia. Assuming the average household contains 2.9 people, about 7 percent of the Sofia's population of 1.2 million receives social assistance.[16]

In other parts of the country, social assistance is paid late or not paid in full. In 1999, 86 percent of the municipalities were unable to pay the full amount required for social assistance benefits, and on average, municipalities experienced a 30 percent funding deficit. According to one analysis, the failure of municipalities to meet their obligation to pay social assistance is due to a number of factors including: (i) a lack of resources at the municipal level; (ii) poor budget planning; (iii) the use of current resources to clear past arrears; and (iv) the use of resources for other purposes. There are insignificant and infrequent penalties for municipalities that fail to meet their social assistance obligations.[17]

The problem of municipalities not paying full social assistance amounts should be largely eliminated by the fact that in 2003, the national government will have provided 100 percent of the social assistance funds. In 2002, the national government was responsible for 75 percent and the municipalities for 25 percent; in 2001, the responsibility was split 50-50.

Rumors that Sofia actually pays what is due have led some households to claim residency in the capital rather than in their hometown. However, this deception is difficult to maintain because families must show their address on their identification card and a social worker visits to check that the family lives at the address that they claim as their home. Families cannot register in more than one town, as there is a national database of households, so they are likely to get caught. Again, the elimination of municipal responsibility for paying a share of the assistance should reduce the motivation of families to claim false residencies.

[14] Dimitar Dukov, EnEffect, Sofia, interview by the author, December 2002.

[15] Ibid.

[16] Ibid.

[17] "Bulgaria: The Dual Challenge," p. 93.

D. Energy Social Safety Net Design and Operation

This section provides an introduction to Bulgaria's energy social safety net, which is described in detail in chapters 4, 5 and 6 (energy assistance payments, energy efficiency, and tariff approaches, respectively).

Everyone eligible for social assistance is automatically eligible for assistance in paying their heating bills under the WSP, although the pool of people receiving heat assistance payments is bigger than the pool of people receiving social assistance payments. In 2001, the MLSP administered the WSP and spent 75 million BGL ($34.24 million), which represents about two percent of total social protection spending by the government that year.[18] However, the WSP, which used to provide vouchers to households but now makes payments directly to energy suppliers, is under-funded and only covers (at most) 70 percent of the heating costs for typical low-income households. In a February 2002 letter to the International Monetary Fund, the Government of Bulgaria committed itself to "substantially raising the share of social expenditure in GDP to continue to support the needy." In particular, the government stated, "We are increasing heating assistance."[19]

Other than the MLSP's one-time distribution of energy-efficient compact fluorescent lamps (CFLs) to low-income households, there has been no low-income energy-efficiency program in Bulgaria (see chapter 5). There are some efforts to improve the energy efficiency of residential buildings, but there is no information to suggest that there is any targeting of low-income buildings or apartments.

Electricity tariffs were raised in July 2002, and an inverted block tariff was established, with current prices in effect until 2004 or 2005 for the first 75 KWh/month in the daytime and 50 KWh/month in the nighttime (see chapter 6). The lower tariff for lower consumption could be considered a "social tariff." The tariff for consumption above 75 KWh/month was raised again in July 2003, thereby increasing the incentive for households to keep their consumption below the 75 KWh threshold.

[18] The World Bank: Poverty Reduction and Economic Management Unit, Europe and Central Asia Department, "Bulgaria: Public Expenditure Issues and Directions for Reform - A Public Expenditure and Institutional Review, Report No. 23979-BUL," (Washington, D.C., August 2002), 124.

[19] International Monetary Fund (IMF), "Bulgaria—Letter of Intent and Memorandum on Economic Policies," (February 12, 2002), paragraph 11, available on the Internet at: http://www.imf.org/External/NP/LOI/2002/bgr/01/INDEX.HTM.

There is a social tariff for district heat for consumers using less than 250 KWh/month. This is a very low threshold. Some low-income households may be able to keep their consumption below this level, but it is difficult to do for most of them.

Chapter 2
The Relationship between the Energy Sector and Poverty

A. Poverty in Bulgaria

Compared to other Eastern European countries, Bulgaria's transition to a market economy has been marked by high inflation, reduced economic output, plunging GDP, and a consequent contraction in living standards. The economy collapsed in 1996-1997, but beginning in 1998, output began to increase, inflation eased, and living standards began to improve.[20] GDP growth is running at about 4.5 percent per year, yet, unemployment has risen and the standard of living for large portions of the population has declined significantly.[21] Unemployment has increased steadily from 12.8 percent in 1994 to 18.1 percent in 2000. The job-finding possibilities in Bulgaria are lower than those in any other Central and Eastern European country.[22] According to the Bulgarian Chamber of Commerce, the unemployment situation will be exacerbated by layoffs associated with requirements to reduce budgetary subsidies and to restructure government infrastructure enterprises in the course of privatization.[23]

Although the Bulgarian government has no official definition of poverty, the World Bank's 1997 poverty assessment found that, using a relative poverty line of two-thirds mean per capita income, 37 percent of the population was poor. This represented a highly significant increase over 1995 when the Bank estimated that just 5.5 percent of the population was poor.[24] Since 1998, improved economic growth has dramatically reduced the poverty level, which fell to 12.8 percent in 2001.[25]

Poverty is highest in rural areas and in major cities other than Sofia. The national unemployment rate is 15 percent (April 2003), while it is somewhat lower in Sofia and the small and medium-sized cities, and higher in rural areas.

B. Energy and Poverty

Energy is one of the highest costs facing low-income households in Bulgaria. The poor spend 14.2 percent of their income on energy, against 11.9 percent for the non-poor. Expenditures by the poor for fuel are second only to food, which represents 72.3 percent of income compared to 68.5 percent for the non-poor.[26]

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[20] The World Bank, Human Development Sector Unit, Europe and Central Asia Region, "Bulgaria, Poverty During the Transition Report, Report No. 18411" (Washington, D.C., June 7, 1999).

[21] "Bulgaria: The Dual Challenge," p. vi.

[22] Ibid., 79.

[23] "GDP Growth Slows Modestly While Trade and Payments Gaps Widen," *Bulgarian Chamber of Commerce News*, (2002), available on the Internet at: http://www.bcci.bg/analytica/2002/ba20020227a.htm.

[24] Ibid., 76.

[25] "Bulgaria: Public Expenditure Issues," p. 127.

[26] "Bulgaria, Poverty During the Transition Report."

As a result of broad energy sector restructuring and energy price rationalization efforts, poor households are experiencing rising prices for all fuels, especially electricity, but also district heat and coal briquettes. Most poor households heat with wood or coal, even in urban areas. The exception is Sofia, where many poor households heat with district heat (see table 2-1), although the very poorest neighborhoods are not connected to the district heating system. Significantly, one-third of poor households in urban areas other than Sofia heat with electricity. These households will be particularly hard-hit by planned tariff increases.

Social assistance is insufficient for most poor households, and the fuel assistance is inadequate to cover most of the cost of heating. The situation is only marginally better for pensioners, who typically receive a social pension of just $20/month. This is not even enough to cover basic needs like food and heat, let alone the typical $20-25/month energy bill.

One of the reasons for high energy expenses is the low energy-efficiency level in residential buildings. According to the Sofia Energy Agency (Sofena), the 1.2 million inhabitants of Sofia consume energy for heating at almost twice the rate of the West European standard.[27]

Table 2-1: Type of Energy Used For Heating by Poor/Non-Poor Individuals, 1997

Type of Energy	Sofia		Other Urban		Rural		Total	
	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor
	%	%	%	%	%	%	%	%
District Heating	68.29	71.07	10.75	18.53	0.00	0.00	14.47	19.65
Electricity	11.59	12.30	33.02	44.96	2.61	5.23	18.57	28.73
Wood/Coal	20.12	13.74	55.03	34.91	97.39	94.00	66.38	50.10
Oil	0.00	0.72	0.68	0.99	0.00	0.08	0.33	0.68
Other	0.00	2.17	0.51	0.62	0.00	0.69	0.25	0.84

Source: Club Economica 2000 Report, *using BIHS data. The poverty line is defined by two-thirds of mean expenditure in 1997.*

Restructuring the district heating sector will likely raise heating costs for the poor still further because these efforts seek to eliminate the government subsidies for district heating companies and instead cover all operating, fuel, and capital costs through customer bill payments. Current billing revenues fall far short of covering the costs, so charges on heat users will have to increase. Unless a meaningful social tariff is adopted, or there is a major increase in fuel assistance payments per household, low-income households will see their heating bills increase. The increase will be partially offset by the effects of the radiator metering program, which in addition to installing heat cost allocators to meter heat consumption, has installed thermostatic radiator valves to

[27] Sofena, EcoLinks Grants Program, "Energy Efficiency Action Plan for Buildings in Sofia" (2001).

allow people to turn down (or off) the radiators' heat output[28] (see chapter 4). The increase could also be offset through the installation of energy-efficiency measures.

[28] As of June 2003, 90% of the nation's district-heated households had the allocators and valves installed on their radiators.

Chapter 3
Energy Subsidies and Assistance Payments

The Bulgarian government's basic social safety net program is the GMI Program, under which almost all assistance payments are rolled into a single payment. However, the GMI payment does not include unemployment payments, pensions, or energy assistance payments.

Energy assistance payments are provided through the WSP, which was established with EU support beginning with the 1996-1997 heating season. The EU provided 20 million ECU[29] that season and the following season. Starting in 1998-1999, the MLSP took over program responsibility and funding.[30] *The Social Aid Act* and *the Decree for the Application of Social Aid Act* provide for energy assistance payments for poor families during the winter heating season, which is defined as running from November 1 to March 31. The program was expanded in 1999, when it reached 12 percent of the population and 19.4 percent of all families. About 630,000 families qualified for WSP assistance that year, although only 530,000 received the assistance. In 2000, the program was expanded by 30 percent.[31] In 2001-2002, it reached about 600,000 families (or about 21.5 percent of all families in the country and reaching about 15 percent of the total population). [32] In 2002-2003, 24 percent of the nation's families received WSP assistance.

A. Assistance Formula

In 2001-2002, low-income families heating with solid fuels or district heat received lump-sum payments. For electrically heated households, a formula was developed to determine the amount of WSP payments per family, as follows:

(FDMI + CuEE) – FMI = monthly assistance amount[33], where:

- The family differential monthly income (FDMI) is the sum of the DMI of the family members.
- The differentiated minimum income (DMI) adjusts the GMI level based on need, i.e., adding a multiplication factor ranging from 0.9 for a healthy adult to 1.5 for a child or elderly person.
- The GMI is defined in 2002 as 40 BGL ($19.41) per adult per month.
- A currency equivalence of electricity (CuEE) is currently set at a value of 37.35. The CuEE is a constant based on an estimated average consumption of 300 KWh at the day price and 150 KWh at the night price.

[29] European Currency Unit, which was withdrawn upon the introduction of the Euro.

[30] The World Bank, Club Economika 2000, "Bulgaria: Assessment of the 1999 Energy Benefit Program" (1999), 1.

[31] The Energy Charter Secretariat, "In Depth Energy Efficiency Review of Bulgaria," (December 2001) CS (01) 620: 14.

[32] "Bulgaria: Public Expenditure Issues," p. 182

[33] "Bulgarian Energy Sector: Assessment," p. 12

- The family's monthly income (FMI) is defined as the income from the previous month.

For example, assume a low-income family of two adults and two children has a typical income of 210 BGL ($102).

- Their FDMI is: (1.5 x 2) + (0.9 x 2) = 4.8
- The family's GMI is: 2 adults x 40 BGL per adult = 80 BGL
- The DMI is: 4.8 x the GMI or 4.8 x 80 BGL = 192 BGL ($92)
- The government's pre-determined CuEE value is 37.35.
- Thus, the monthly heating subsidy is: 192 (the DMI) + 37.35 (the CuEE) – 210 (the FMI) = 19.35 BGL ($9.40) per month.

As a result of the MLSP and MEER review in December 2002, *the Regulation for Implementation of the Law on Social Assistance Benefits* was amended by virtue of *Ordinance 183 of 09.08.2002*. The social assistance for space heating is not income-complementary any more. For the 2002-2003 heating season, a new formula was implemented, based on a GMI for heating.

The monthly assistance amount is 45.38 BGL. For 2002-2003 there was no income-related complement. The maximum amount of 45.38 BGL is available to everybody, but the amount paid is only to the level of real consumption.

For example, let us assume a low-income family of two adults and two children using electricity or DH for space heating. Their FDMI is: (40GMI) x 4.8 (family coefficient for the heating season) = 192.00 BGL + 45.38 BGL = 237.38 BGL secured family income. This means that this family should have an income of less than 237.38 BGL to be able to qualify to receive 45.48 BGL social assistance benefit for heating.

B. Winter Supplement Program Administration

The National Social Assistance Service (NSAS), an MFSP affiliate, is authorized to administer the WSP under Article 15 of the *1999 Ordinance for Social Assistance*, through a series of municipal assistance centers. In addition to providing energy assistance, the centers provide a range of other in-kind and cash assistance, as well as services such as meals-on-wheels and daycare for old people with light mental problems. In Sofia, there are nine centers, or "Municipal Social Centers." The centers do the intake for the WSP and forward the applications to the NSAS, which, upon approval of applications, makes payments to the utilities.

Once a family's WSP payment amount is approved, the MOF pays it to the NSAS. The NSAS pays the appropriate municipal assistance center, which pays the electric company or district heating company, which in turn reduces the family's utility bill accordingly.

If a family heats with coal or wood fuel, it is given a voucher by the municipal assistance center for a flat amount of 150 BGL ($73). The family gives the voucher to the fuel supplier in exchange for fuel. To be compensated, the supplier submits the vouchers to the municipal assistance center. The center pays 20 percent of the voucher value to the

supplier at the end of the current year, and the remaining 80 percent the following April. This delayed payment is not popular with the fuel suppliers, who, as a result, do not like to accept vouchers.

As of March 2002, the MLSP introduced the following regime for electricity: If a household consumes 40 BGL ($19.40) worth of power, it receives a direct payment of 40 BGL; but if it only consumes 30 BGL ($14.60) worth of power, it only receives 30 BGL. This regime would seem to discourage energy efficiency as it encourages families to consume up to the 40 BGL limit. However, the reality is that low-income families exceed 40 BGL worth of power consumption even with extremely careful use of their electric heaters.

For example, assuming that a low-income household heated with electricity can afford to buy a cheap 2 KW electric heater, the most popular kind, which can heat one room. With 40 BGL, the household can buy 425 KWh of electricity, including 75 KWh at the low daytime rate and 50 KWh at the low nighttime rate, or about 0.094 BGL per 1 KWh. To heat the room only half of the time, the heater will consume in one month: 2 KW x 12 hours x 30 days x 0.094 BGL= 67.68 BGL, easily exceeding the 40 BGL assistance payment.[34]

The WSP has encountered some problems with corruption and inefficiency. As a result, many eligible households have not received the municipal portion of their WSP credits. In addition, many ineligible households have received credits, according to the EBRD. Poor metering, poor meter reading, and miscalculated utility bills exacerbate these problems, which are particularly acute in areas outside of Sofia. [35] All these problems should be largely eliminated with the phasing out of the municipal government contribution to the WSP in 2003.

One of the conditions on the World Bank's $450 Programmatic Adjustment Loan (PAL) is that there be an examination of, and possibly an increase in funding for, the WSP. As of mid-2002, a World Bank consultant had begun examining the impact of higher electricity tariffs on the poor.

Table 3-1: WSP Expenditures and Participation [36]

Heating Season	Expenditure		Participating households	Calculated average per household.	
	Million BGL	Million $		BGL	$

[34] Dimitar Dukov, EnEffect, Sofia, interview with the author, December 2002.

[35] There is a (long) process for appealing miscalculated utility bills. However, the miscalculated amount must be paid prior to the appeal process moving forward. If the process determines the bill was indeed miscalculated, the overcharged amount is subsequently refunded. But for poor households, paying the miscalculated amount up front can be a major financial burden.

[36] Figures provided by Stefan Gashparov and Costov Costov, Ministry of Labor and Social Policy, May 2002, except for expenditure figures, which are from "Bulgaria: Public Expenditure Issues and Directions for Reform," p. 182.

1998-1999	147.6	80.2	520,000	284	154
1999-2000	61.6	28.9	530,000	116	54
2000-2001	66.4	30.3	541,000	123	56
2001-2002	74.5	23.1	600,000*	124	39

* Estimated

In 2002-2003, about seven to eight percent of all Bulgarians received WSP assistance. This percentage will increase to ten percent because the eligibility criteria are being somewhat relaxed. Program expansion is currently under consideration. In April 2002, MEER and MLSP decided to enact regulatory changes in response to rising electricity tariffs. *Ordinance 183* was approved August 9, 2002 and changed *the Law on Social Assistance* regulations to recalibrate the monthly WSP payments (see appendix 2).

Originally, the WSP provided payments directly to families, but as some did not use the money to pay the heating bills, Article 25 of *the Ordinance for Social Assistance* was changed so that payments now go directly to the fuel suppliers.

C. Winter Supplement Program Budget and Expenditures

For the 2001-2002 season, the total assistance funds that the MLSP allocated in compliance with the *Regulation for Application of the Law on Social Assistance Benefits* amounted to BGL 122.4 million ($55.7 million; BGL 120.7 million was actually disbursed). An additional BGL 92.3 million ($42 million) was disbursed for heating assistance. In 2002, the budget for the 2002-2003 heating season was 110 million BGL ($53.4 million). The average payment is around 200 BGL ($97) per household per winter, which covers up to 70 percent of the average household heating bill.

In addition to the WSP payments, at least one fuel company is providing some free fuel. During the winter of 2000-2001, the refinery company, Bourgas, donated some heating oil to the “social houses,” which include homes for the elderly or those with light mental disabilities.

In Sofia, during January to March 2002, roughly 2.6 million BGL ($1.26 million) was spent on energy assistance, while from January through April 2001, expenditures were about 3.3 million BGL ($1.5 million). Between November 1, 2001 and April 15, 2002, the Sofia municipality disbursed exactly 4,243,352 BGL ($2.06 million) in heat payments, which is almost twice the amount disbursed during the previous winter.

D. Toleration of Nonpayment

Nonpayment of utility bills has traditionally been a problem in Bulgaria. According to USAID, industry is the largest non-paying sector. According to the MLSP, the Roma represent an ongoing nonpayment problem in the residential sector. In one Roma region, unpaid bills amount to 120,000 BGL ($54,800) per winter month. According to the Ministry, the only solution is to recognize that the bills are unrecoverable and open new accounts for the new heating season 2002-2003 with a new cutoff policy for nonpayment.

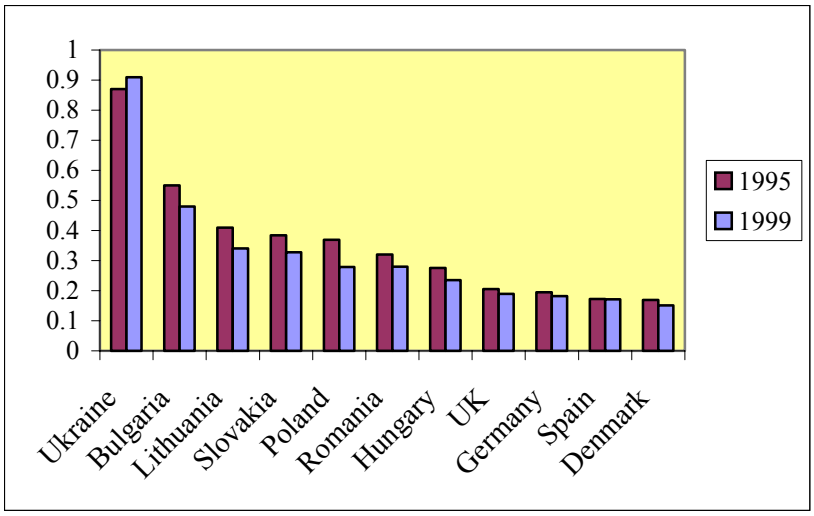
There is some toleration of nonpayment, particularly in the district heating sector. This toleration amounts to a subsidy. While it is reasonable to assume that such a subsidy benefits mainly low-income households, there is no evidence to suggest this. Studies in other countries have found that many middle-class and even affluent households are part of the nonpayment problem. Thus, toleration of nonpayment is not a well-targeted subsidy. The subsidy cannot survive if the utilities are to be privatized.

Chapter 4
Energy Efficiency

A. Energy Intensity and Consumption

Bulgaria's use of energy is highly inefficient. If the measurement of energy intensity is used— that is, energy consumption per unit of GDP—then Bulgaria has the most energy-intensive economy in the Southeastern European region and one of the highest in all of Europe. Its energy intensity is 40 percent higher than that of Romania, two times higher than that in Hungary, the Czech Republic, and Poland, and three times that of the OECD countries.[37]

Figure 4-1: Energy Intensity In Selected Countries (Mtoe / billion 1995 US$ PPP)



Source: The Energy Charter Secretariat, December 2001.

Similarly, Bulgaria's per capita electricity consumption, at 3,633 KWh/per capita, is one of the highest in the region. The only countries with higher per capita electricity consumption—the Czech Republic, Slovak Republic, and Slovenia—each have a larger GDP than Bulgaria.

Much of Bulgaria's energy intensity is due to its heavy industrial base, particularly in chemical processing, which uses outdated and energy-inefficient technology. By contrast, the residential sector is not inordinately energy-intensive. However, while per capita household energy use is lower in Bulgaria than in many other countries in the region, per capita household *electricity* consumption, at 3,698 KWh per household, is higher in Bulgaria than in Estonia, Lithuania, Romania, Slovakia, and Turkey (see appendix 6). This is largely due to low electricity prices (although these are now being raised) and the widespread use of electricity for space heating, water heating and cooking, particularly when compared with countries with better developed natural gas

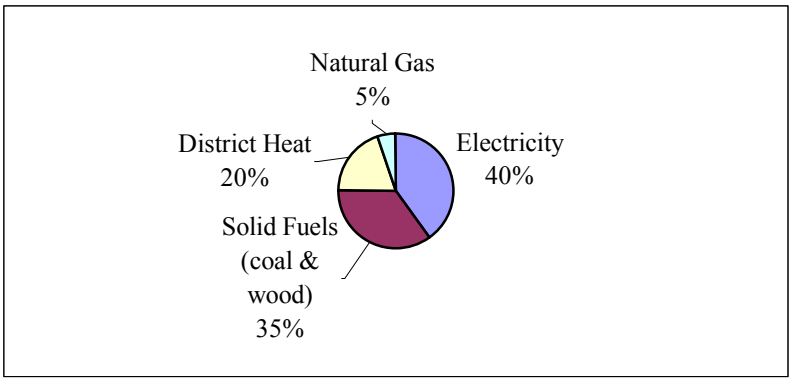
[37] *Bulgaria National Energy Strategy - 2001*, p.10.

distribution networks that service much of these categories of household energy demand.

Bulgaria's residential sector accounts for 21 percent of the country's total energy consumption and 39 percent of total electricity consumption. Within the residential sector, electricity accounts for 40 percent of household energy consumption, followed by solid fuels (wood and coal), district heat, and natural gas (see figure 4-2).

Low-income household energy consumption statistics are not available, but it is likely that the percentages for both solid fuel and district heat are higher for low-income households, while the percentages for electricity and natural gas are lower.

Figure 4-2: Residential Energy Consumption by Fuel Type, 2002



Source: European Union, "SAVE II Study," 2002.

Breaking out residential electricity use, households use electricity mainly for space and water heating, which accounts for 62 percent of residential electricity consumption, followed by household appliances and lighting (see figure 4-3).[38]

Much electrical heating in Bulgaria is derived from small 2 KW electric heaters, which are switched on for short durations that coincide with the peak periods of electricity demand. One million households switching on a heater around the same time would drive up peak demand by 2,000 MW. Building new generation capacity to meet this demand would cost about $2 billion for lignite-based capacity or $1.0 billion for gas-based capacity. Efficient gas or district heating systems could be constructed (or rehabilitated in the case of district heating) for a fraction of the cost.[39]

B. Residential Energy Efficiency

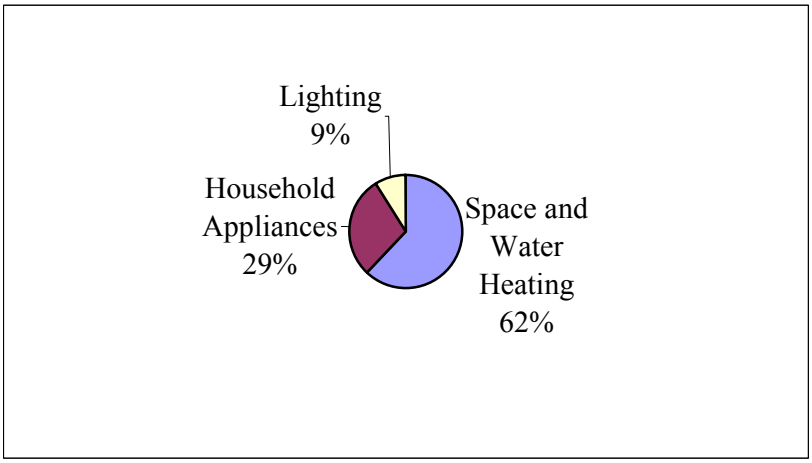
There is a low level of energy efficiency in the residential sector. There is no thermal insulation in the basements or roof slabs in 80 percent of the existing buildings. The vast majority of buildings suffer significant heat loss through external walls. Low-

[38] Appliances include radios, TVs, videocassette recorders and players, coffee machines, sewing machines, refrigerators, freezers, washing machines, vacuum cleaners, irons, electric dryers, dishwashers, and air conditioners.

[39] The World Bank, "World Bank Energy-Environment Review" (Washington, D.C., November 2001), iv.

efficiency incandescent light bulbs are used in both apartments and public areas in nearly all residential buildings. Energy-efficient appliances, although available, have not significantly penetrated the residential sector, particularly low-income apartments, and the often poor-fitting window and doorframes usually lack caulking or weatherstripping and thus leak heat from the apartments.

Figure 4-3: Household Electricity Consumption By Application, 2002



Source: European Union, "SAVE II Study," 2002.

The 1999 Energy and Energy Efficiency Act provided authority to the SEEA, a semi-autonomous agency under MEER, to prepare an energy-efficiency strategy. It also allowed for the establishment of energy centers around the country and required energy-efficiency labels on, and energy-efficiency standards for, all appliances and buildings. However, there are no provisions for testing the appliances or buildings for their energy efficiency, and no budget for testing, labeling, or standard-setting activities. Still, Bulgaria has taken a number of steps to improve energy efficiency. Most of these have been in the industrial sector, although there have been some efforts in the residential sector as well. These efforts have not targeted low-income buildings or households.

C. Low-Cost Residential Energy-Efficiency Measures

The low-cost energy-efficiency measures recommended for apartment buildings in the SAVE II energy efficiency assessment of Bulgaria include the following:

- Fit spring door-closers to all external doors.
- Fit draught sealing to the leakages of the windows.
- Replace the existing single glazing with double pane glazing. (This is a compromise solution that is often sub-optimal, as although secondary glazing can be is a low-cost solution for improving thermal performance of existing single glazing, the need to retrofit a second pane of glass to an existing single-pane window rarely allows for an optimal gap between panes, from the point of view of decreasing heat transfer.)

These measures will help reduce consumption of electricity as well as district heat, which are the main space heating fuels in urban households. For low-income households using district heat, the best opportunity for electricity savings lies in lighting and televisions and, in some low-income households, refrigerators. According to a EU SAVE II energy-efficiency study and illustrated in table 4-1, converting incandescent light bulbs to compact fluorescent lamps (CFLs) in Bulgaria can result in a 36 percent rate of return.

Table 4-1: Impact of Replacing Residential Incandescent Lamps With CFLs[40]

Investments[41]		Payback Period	Net Present Value		Internal Rate of Return	CO_2 Reduction
BGL 000s	USD	Years	BGL 000s	USD	%	Tonnes 000s
108,000	47,222	2.7	124,082	56,621	36.4	285.1

According to both the chief of MEER's District Heating Division and the chief of the Sofia government's Engineering and Infrastructure Department, most people have taken basic weatherization steps such as caulking their windows, particularly those households using expensive electricity for heating. However, neither they nor anyone else could provide documentation of such weatherization steps being undertaken. In fact, the SAVE II energy-efficiency study found that leakage around windows remains a major problem. As shown in table 4-2, sealing the windows in a typical apartment building would result in even higher returns—an incredible estimated 163 percent return—than replacing electric lights.

Table 4-2: Impact of Sealing Apartment Building Windows

Investments		Payback Period	Net Present Value		Internal Rate of Return	CO_2 Reduction
BGL 000s	USD	Years	BGL 000s	USD	%	Tonnes 000s
24,083	10,997	0.6	205,800	93,973	163.2	223

Some companies installing the HCA/TRV bundles also offer energy-efficiency measures such as foil backing sheets for insulating behind radiators, but few householders agree to buy these. The 12- or 22-month financing, which is available for the bundles, is not available for energy-efficiency measures. The thermally insulating foil sheets cost $3 to $6/square meter and result in savings in the range of 6 to 12 percent.

[40] Assumes replacement of approximately 9 million incandescent lamps with average power of 60 W with energy saving CPLs with average power of 11 W with the same brightness in the household sector.

[41] EU, "Study on the Possibility for an Implementation of A Widespread Energy Saving Program in Bulgaria," National Energy Saving Action Plan, SAVE II (Brussels, 2002).

D. Higher-Cost Residential Energy-Efficiency Measures

The higher-cost energy-efficiency measures recommended for apartment buildings in the SAVE II energy efficiency report include the following:

- Replace the existing single pane windows with sealed double pane units.
- Fit thermal insulation on the outer or inner surface of the building enclosing elements. The inner heat insulation is a cheaper solution but is connected with reparation of the dwellings. Freezing of water condensated in the bricKWork could also be a problem. The additional heat insulation of the walls is an expensive long-term measurement.
- Insulate the roof with at least 150 mm of mineral wool. It must be placed on the inside of the roof supports with a ventilated space between the insulation and the tiles. This will ensure continuation heat storage in the roof space and decrease the temperature swing in the heated spaces.
- Fit heat insulation below the concrete plate between the first floor and the unheated basement. This approach avoids the need to enter apartments.

Building walls offer one of largest residential energy-efficiency opportunities. Thermally inefficient gaseous concrete is used in building construction, resulting in poor heat insulation of the building envelope. The main energy-efficiency measure needed is wall insulation either on the inside of exterior walls or (preferably) attached to the entire outside shell of the apartment buildings.

As illustrated in table 4-3 below, according to the SAVE II energy-efficiency study, interior insulation of external walls of a typical Bulgarian apartment building can result in a rate of return of over 20 percent.

Table 4-3: Impact of Insulating The Interior of Outside Apartment Building Walls

Investments		Payback Period	Net Present Value		Internal Rate of Return	CO_2 Reduction
BGL 000s	USD	Years	BGL 000s	USD	%	Tonnes 000s
172,762	78,886	4.5	51.548	23,538	20.9	218

There are four barriers to wall insulation:

1. Households do not generally believe that the projected savings will actually materialize.
2. Even if the households do believe the savings will materialize, they cannot afford the up-front cost of the insulation. It can cost as much as 30 percent of the apartment's value.

3. Even if some of the residents can afford the cost and are willing to put up their share, it is unlikely that 100 percent of the households in a building would agree to do so. Individual households can and do install their own insulation, typically 2-4 centimeters on the inside wall, but the best efficiency is achieved if all households agree to the external type. Household participation might be increased if financing was available, but energy-efficiency financing is not available to either apartments or overall buildings. While condominium associations in other countries are looking into the possibility of borrowing funds for energy efficiency and other improvements, there is no tradition of apartment associations in Bulgaria, let alone apartment associations with the legal status to borrow money.

4. Even if the households believe the savings will materialize and if they can get financing, under current national law, any improvements will result in higher property taxes, thereby offsetting a portion of the energy savings.[42]

Orkikem, the private distributor of Dow insulation, says it has some sales of its external insulation for unsubsidized applications in residential buildings. So there appears to be a nascent insulation market, most likely involving apartment buildings with relatively affluent residents, as well as newly constructed buildings.

New buildings are required to have wall insulation (either internal or external) installed, according to *Ordinance #1 of January 5, 1999* prepared by the Ministry of Regional Development and Public Works (SG 007 from 1999, in force from April 26 1999). The law requires walls of new buildings to have a specific thermo-resistance (R value). How this is achieved is up to the individual builder. But builders have not considered this to be a problem because, for the most part, they do not comply with the ordinance and there is no government enforcement.

Some buildings in Sofia are incorporating energy-efficiency measures to attract tenants, since there are more apartments available than there are tenants to fill them, according to SEEA. This condition will not last, however, because with 14 to 15 percent unemployment outside of Sofia and just three to four percent unemployment within Sofia, many people are relocating to the capital.

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[42] Under Bulgaria's *Law of Local Taxes & Fees*, municipal governments may raise the property tax value (tax base) on households that make energy-efficiency improvements. The law provides a methodology (used by Sofia, among other cities) for calculating an apartment's tax value. Assume that an apartment without any energy-efficiency improvements has tax value BGL 40,000 (a three-room apartment of average quality). Its tax value will increase if the household has:

- Air-conditioning: The tax value will be multiplied by a coefficient of 1.06 (a 6% increase);
- Energy-efficiency frames and windows: The tax value will be multiplied by a coefficient of 1.04 (a 4% increase);
- Wall insulation: The tax value will be multiplied by a coefficient of 1.03 (a 3% increase).

Adding these together: 1.06 + 1.04 + 1.03 = 1.13; multiplying by the original tax value: 40,000 x 1,13 = 45,200, which is the new tax value. The added tax value due to energy efficiency improvements is: 45,200 – 40,000 = 5,200. On top of this additional amount, the apartment owner has to pay an additional 1.5% property tax and 3% garbage collection tax, or 4.5/1000 x 5000 = 22.5 BGL. The sum is not very big but it is discouraging for the people. For 2003, the rate has been raised to 4.75/1000 over tax value.

E. Metering and Control

1. Electricity Metering

Nearly all households in Bulgaria have electric meters, although reportedly many are old and can be easily stopped or altered. The EBRD-administered KIDSF will be used in part to pay for the replacement of old electric meters with modern tamper-proof models.

Nonpayment can and does result in disconnection of electric service. In the spring of 2002, in the relatively prosperous city of Plovdiv, the disconnection of non-paying customers resulted in riots, replete with smashed store windows and burning cars. MEER dismisses this incident as a unique case involving the Roma, who allegedly "never pay their bills," but according to other commentators, it may foreshadow increasing social dislocation as electricity prices continue to rise and more households have difficulty making their payments. It also may foreshadow increased meter tampering and electricity theft.

Network technical losses are about 10 to 12 percent. In the last three years, the Sofia electricity distribution company reported technological losses of about 19 percent (19.54 percent in 2002). The loss due to electricity theft ("trade loss") is about ten percent. The nonpayment rate can run as high as 43 percent during winter months due to high heating bills. But most people pay their arrearages in the subsequent months so that they will not be disconnected. In cases where customers are late with bill payment three times, the Sofia distribution company installs special equipment to limit available power. The company requires prepayment of the power in some cases.[43]

2. District Heat Metering

Historically, Bulgarian households have not had their heat usage metered. Their heating bills were based not on consumption but on the number cubic meters of apartment space heated. As of mid-2003, the process of changing this is almost complete. All households must have meters or HCAs and TRVs installed on all actively used radiators.[44]

HCAs meter the relative heat consumption at each radiator in a building so that households can be charged according to their heat consumption. TRVs allow households to adjust the amount of heat generated by each radiator (including turning them completely off when no one is home), allowing the households to conserve energy and, thus, lower their heating bills. According to an EU SAVE II study,[45] an average of

[43] Dimitar Dukov, EnEffect, Sofia, interview with the author, December 9, 2002

[44] An HCA measures the relative energy consumption of a single radiator. This technology only works if a "basement heat meter" or "master meter" is installed in the building to measure the building's total heat consumption and if all (or most) of the other radiators in the building are fitted with identical HCA models. Households are billed not based on their consumption of measurable units of heat but on their relative "share" of the building's total heat consumption.

[45] The World Bank, "Study on the Possibility for an Implementation of A Widespread Energy Saving Program in Bulgaria," National Energy Saving Action Plan, SAVE II (Washington, D.C., 2002), 20.

14 percent energy savings was recorded over the 1999-2000 heating season in the 1,320 apartments in one Sofia district that had the HCAs and TRVs installed. The financial benefits of investing 540 million BGL ($262.14) to install HCAs and TRVs on all radiators in Bulgaria, assuming that installations will generate average savings of 12 percent, are presented below.

Table 4-4: Financial Returns From Installation of HCAs and TRVs[46]

Investment		Payback Period	Net Present Value		Internal Rate of Return
BGL (000s)	$	Years	BGL (000s)	$	%
54,000	26,214	2.5	109,610	53,209	39.6

Individual meters for hot and cold water have been mandatory for two years and are now nearly universal, with every apartment equipped with low-cost household volumetric meters in the bathroom and kitchen. The water company also meters the building via a meter in the basement. There is, at most, a 10 to 12 percent discrepancy between the master meter and the sum of the individual apartment meters, with the utility's meter taking precedence and the difference being split between the householders. The few households that did not comply with the law now have to pay a fixed rate that is six times higher than a typical water bill, so there is a strong economic incentive to comply.

Following the success of the water-metering program, the government further embraced the concept of household-level metering by creating a legal requirement for households to install HCAs (for heat metering) by September 2002. Although full compliance with the law did not meet this deadline, compliance in mid-2003 stood at 90 percent.

Noncompliance penalties have not yet been enforced, partly because the metering companies were not able to keep up with the demand for installing the HCA/TRV bundles. Instead, MEER will enact penalties if a building or household does not have a signed contract with a company for HCA installation. With most households already metered, the penalties are largely a moot issue.

As a result of a government program initiated in 1996, all district heated residential buildings have had building-level heat meters in the basement, except in Sofia where compliance is at the final stages. The basement meters are a (technical) prerequisite to installing the HCAs and TRVs on each radiator.

There are currently 16 private contracting companies installing the HCAs and TRVs.[47] For technical reasons, all radiators in a given building must use the same type of HCA, so the households have had to come to an agreement on which kind to install. They do

[46] SAVE II Report, p. 38.

[47] Dimitar Dukov, interview with the author, December 2002.

not have to install the same TRVs, but it is easier to have both installed by the same company, which usually offers a package deal for both items, known as an "HCA/TRV bundle."

The Gabrovo City Model Metering Program

From 1999 to 2000, 20,160 HCAs were installed in households in Gabrovo city under a greenhouse gas mitigation program funded by the national government and the Global Environment Facility. The district heating company, Toplofikatsiya Gabrovo SPJsC, and the non-governmental organization (NGO), EnEffect, coordinated the program. The HCA installations were accompanied by a broad information campaign to promote heat accounting and TRVs. Toplofikatsiya Gabrovo SPJsC provided opportunities to purchase the valves at a preferential price.

In the summer of 2000, EnEffect and Toplofikatsiya Gabrovo SPJsC initiated a new TRV campaign that included an incentive program to promote sales. Any residential customer who purchased one or more TRVs from Toplofikatsiya Gabrovo SPJsC could obtain one valve for free, including installation. Families that were qualified for fuel assistance benefits under the WSP had the right to an additional TRV. Every consumer who received a TRV under the program also received a *User Guide* that Danfoss published. The campaign was broadly publicized through local press and radio stations.

By the end of 2001, residential customers had purchased 2,570 TRVs. This triggered the distribution of an additional 1,527 free valves, including 221 to low-income households. In addition, the residents of a demonstration apartment block received TRVs for their radiators, including free installation. By the end of 2001, the total number of TRVs installed in the Gabrovo district heating system was 8,634 or 43 percent of the radiators that were already equipped with HCAs.

Source: Dimitar Dukov, EnEffect, Sofia, November 27, 2002

Each household must pay for its own HCA/TRV bundle. According to Obeka 92, an installer of Techem brand HCAs, an HCA costs about 33 BGL ($16); a TRV costs 25 BGL ($12).[48]

Heat Meters, Valve Financing and Giveaways

Private metering companies are using supplier credits to provide financing for HCAs and TRVs. The financing is available to all households and basically involves a simple installment loan; a household makes a down payment and monthly principal and interest payments. The term is 12 months in Sofia, 22 months in other towns.[49] The availability of financing has contributed to the high compliance with the HCA installation requirement. (Appendix 7 contains a sample contract for HCA/TRV installation and financing.)

[48] According to the Sofia Municipality, it costs 60 - 70 BGL per radiator to install an HCA and TRV, somewhat higher than cited by the installer.

[49] According to the Sofia Municipality, there is insufficient funding to administer the HCA installation program.

There is anecdotal evidence of some low-income households receiving free HCAs from time to time, but this is an ad-hoc goodwill/marketing initiative of the companies that install the HCA/TRV bundles and represents the exception, not the rule.

There was a poorly implemented program to provide free TRVs to low-income households that resulted in households being given a low-cost unit, but there was no information available about what it was for or how to install it. This happened before HCAs were mandatory, so there was no financial incentive to fit or use these technologies. According to Techem, when HCA/TRV bundles are fitted, it is sometimes found that a household already has a TRV, normally in a drawer rather than on a radiator, so Techem installs it at the same time as installing the HCAs and the additional TRVs that the household buys as part of the "bundle."

3. Heat Billing

Billing companies determine the HCA-based heat consumption billable to each household and collect the bill payments on the behalf of the district heating companies. The billing companies (typically owned by the HCA companies) prepare detailed well-designed bills for the households, taking the recorded heat consumption for the building (as determined by the basement heat meter), plus any other charges levied by the district heating company on the building, factoring in re-payments due on a HCA/TRV bundle, and a small collection charge. This is an example of a best practice that differs from that observed elsewhere in the region, where heat-billing methodologies can be shrouded in mystery and unintelligible to the household.

As mentioned, the old billing system charged households solely on the basis of the number of cubic meters of apartment space. Now, each household decides how many cubic meters it will heat in the upcoming heating season. A calculation is made by the district heating company to determine how much heat that will involve, and the household then makes monthly payments based on that. At the end of the heating season, a meter reader comes and determines how much heat was actually used, and the household makes an adjusted payment if it consumed more than was estimated. At that point, the meter reader and the household sign a document certifying actual heat consumption. The certification is intended to reduce future disputes and corruption.

Another method for reducing corruption was the installation of a master heat meter in each building.[50] The master meters record total heat consumed by the building. They cost $350-$500 and are installed and paid for by the district heating company. There is a similar certification process for recording the master meter readings—the meter reader and a representative of the building residents sign the certification, and it is posted at the meter for all residents to see.

[50] Actually, there is typically more than one master heat meter in a building. A master meter is connected to each district heat piping loop in the building, usually located at each staircase.

F. Low-Income Energy-Efficiency Policy and Actions

Bulgaria's Energy and Energy-Efficiency Strategy briefly mentions the need to provide energy-saving measures to low-income households (see appendix 5). However, there is no low-income energy-efficiency or weatherization program in place or under preparation. There has been at least one national government program, albeit a temporary one, to help the poor with energy efficiency. The MLSP distributed two million energy-efficient CFLs over the span of two years to social assistance customers and social institutions. It was a domestic initiative, not supported by donor funds, and approved June 8, 1998 under *Decision N 272 of the Council of Ministers*. The funding came from 1998 WSP funds. The program was continued in 1999 under *Decision N 151* of March 31, 1999 using 1999 WSP funds. The program was completed on July 30, 1999. There are no plans for continuing it in the future. The CFLs were distributed as follows:[51]

- 535,446 CFLs to the Municipal assistance centers for low-income households.
- 26,940 to Social Service Centers and Institutions.
- 23,200 to the Ministry of Health Care for hospitals.
- 42,104 to the Ministry of Education for schools.
- 83,686 to the Ministry of Culture.

Although there are no low-income energy-efficiency programs, there are some efforts in the residential sector which could benefit low-income households. In Sofia, the municipal government has adopted a goal of reducing energy consumption by 30 percent through the introduction of energy-efficiency measures in both residential and public buildings. The first step was the preparation of an energy-efficiency action plan, finalized in July 2000. The plan assesses energy consumption in Sofia buildings, identifies appropriate energy-efficiency measures, and recommends possible approaches to financing and possible sources of funds.

On the national level, the National Energy Saving Action Plan that the SAVE II report proposed recommends developing legislation for thermal energy conservation in buildings, including both standards (with enforcement) and household financial incentives. The plan is not being implemented at this time due to a lack of funding and legal authority.

In the absence of any national or local low-income, energy-efficiency programs, there have been some one-off, donor-supported, energy-efficiency demonstration programs in the residential sector. For example, in 1993 USAID supported some energy-efficiency demonstration projects in different building types, such as hospitals and apartment buildings. Different measures were installed, including exterior-mounted wall insulation. Information is unavailable on the socio-economic composition of the apartment buildings' residents. The EU PHARE program has funded other demonstrations.

[51] Dimitar Dukov, interview with the author, December 2002.

G. Institutional Facilities

Although there is no program to provide energy-efficiency services to low-income households, there have been efforts to improve the energy-efficiency of buildings that house institutions that provide services to low-income people.

There are 248 “social institutional” buildings in Bulgaria. These are homes for elderly people and other disadvantaged groups that fall under the MLSP’s jurisdiction. These buildings are typically poorly insulated and have old electric meters and inefficient lighting, resulting in high energy expenses. Energy audits conducted in a sample of these buildings show significant savings potential. They could benefit by improving the heating and hot water systems, improving the thermal efficiency of the building envelope, and reducing electricity consumption through improved lighting and installation of new two- and three-tariff time-of-use meters. According to the MLSP, the managers of some of these buildings have adopted some energy-efficiency measures, but there is no documentation available.

Bulgaria has approximately 200 public hospitals. Municipal governments own most of them. In general, the public hospitals are energy-inefficient and have high energy bills. They could benefit from such energy-efficiency improvements as rehabilitating the boiler and pipeline system and converting them from steam to hot water; installing roof insulation, TRVs on radiators, and two- and three-tier electric meters to take advantage of lower tariffs during off-peak periods; replacing incandescent lamps with CFLs, and weatherstripping windows. There have been some energy-efficiency demonstrations in hospitals, but there is no documentation of the energy savings achieved.

In addition to projects in institutional facilities, there have been efforts to address municipal facilities and get municipal governments involved in providing or sponsoring energy-efficiency services. Municipalities are participating in USAID’s development credit program (see section H, below). In addition, the United Nations Development Programme (UNDP), with Global Environment Facility (GEF) funding implemented the Energy Efficiency Strategy to Mitigate Greenhouse Gas Emissions in Bulgaria Project. The project involved providing energy-efficiency training and demonstration projects for municipal governments and improving street-lighting systems, starting with Gabrovo city. Under USAID’s Environmental Action Programme Support Project, Stara Zagora city was provided with technical assistance and financing to convert boilers in 21 municipal facilities from traditional fuels to natural gas, thereby reducing energy consumption and air emissions. Data on energy savings from these projects is unavailable as no post-installation monitoring or economic evaluation was undertaken.

H. Commercial and Industrial Facilities

As in other countries, most of Bulgaria’s energy-efficiency efforts target the commercial and industrial sector. These efforts, while not directly relevant to improving the energy-efficiency of low-income households, show that there is energy-efficiency project capability in Bulgaria. USAID has played a major role in this sector, supporting institution-building and financing activities. USAID’s Municipal Energy Efficiency Project helps Bulgarian companies and municipalities identify energy-efficiency project

opportunities, develop bankable projects, and raise capital for them. Under a Development Credit Authority agreement with the United Bulgarian Bank, the U.S. government guarantees up to 50 percent of energy-efficiency loans. The program is now leveraging $1.00 of private capital for energy efficiency for every $.011 provided.[52]

I. Energy-Efficiency Institutions

1. National Government

The main governmental energy-efficiency institution in Bulgaria is the SEEA, which was established in 1997 as an independent agency (called the National Energy Efficiency Agency), but is now a MEER subsidiary. The SEEA is responsible for formulating energy-efficiency policy, proposing legislation, designing programs, licensing energy-efficiency auditors, collecting and analyzing data, and other tasks related to improving Bulgaria's energy efficiency in all energy-using sectors.

The Ministries of Economy, Environment and Water, Regional Development, and Public Works also have some jurisdiction in energy-efficiency matters. The Ministry of Economy supports energy efficiency through its Center for Energy Efficiency in Industry, established with support from the Japanese International Cooperation Agency. The Ministry of Environment and Water (MoEW) manages the National Environment Fund and the Municipal Environment Funds. These funds, which are capitalized by environmental and fuel consumption charges, can be used for energy-efficiency activities. Under the *Environmental Protection Act*, financial mechanisms may support environmental projects such as the National Environmental Fund (State Gazette No. 5/1993). *Governmental decree No. 194* of 5/8/96 (State Gazette No. 72/1996) regulates how the funds may collect and manage their money. The National Environmental Protection Fund, which provides grants and low-interest loans to municipalities and companies, receives 60 percent of its funds from permit fees that the MoEW collects for pollution up to the maximum admissible norms. It also gets funds from environmental enforcement penalties and surcharges on imports of gasoline, diesel and residual fuel. The fund's annual capitalization is about 30 million Euros.

MoEW handles Bulgaria's obligations under the United Nations Framework Convention on Climate Change (UNFCCC) and prepared the country's National Climate Change Action Plan. The plan includes a number of energy-efficiency measures. The Bulgarian government is also a signatory to the Kyoto Protocol, committing it to reducing greenhouse gas emissions by 8 percent by 2012 from its 1988 levels. The government also supports the Joint Implementation mechanism under the UNFCCC, which is a way of attracting foreign investment for domestic greenhouse gas-reducing projects, such as energy-efficiency projects. A project preparation unit and a joint implementation unit (JIU) were established in 2000 with Dutch government assistance. A major part of JIU's responsibility is to promote the Dutch government's ERUPT greenhouse gas reduction

[52] USAID mission, Sofia, available on the Internet at: http://www.ee-environment.net/docs/bulgaria.shtml, and Electroteck, at: http://www.electrotek.com/meep/eng/Successstoriesfiles/Succstrs/10eng.pdf

program and increase the quality and the quantity of future Bulgarian projects submitted to ERUPT.

2. Non-Governmental Organizations (NGOs)

NGOs are active in addressing energy efficiency. The best-known organization is EnEffect, supported largely by USAID. This organization identifies and prepares energy-efficiency projects and business plans; undertakes some projects on its own; serves as the secretariat for the Municipal Energy Efficiency Network that operates in the Central and Eastern European (CEE) region; participates in the regional Rational Use of Electricity and Water Program; and is hoping to initiate a program, with USAID support, to improve energy efficiency in government buildings and facilities. EnEffect is also the lead organization in developing the Municipal Energy Efficiency Network of Bulgaria, which will provide municipalities with information and advice on how to improve energy efficiency in all sectors.

The Sofia Energy Agency (Sofena) also focuses on energy efficiency, promoting the establishment of two energy-efficiency funds, one of which would target municipal buildings and the other of which would target residential buildings (see chapter 7).

3. Private Companies

In the private sector, Bulgarian banks do not commonly finance energy-efficiency projects and measures. The only commercial Bulgarian bank involved in financing energy-efficiency projects is the United Bulgarian Bank (UBB), which participated in two USAID-sponsored guarantee programs. UBB is working with USAID on the Development Credit Authority Mechanism, under which municipalities and industrial enterprises receive loans from the bank, with 50 percent of the loan guaranteed by the US government, thereby making bank participation feasible.

Chapter 5
Energy Prices and Tariffs

A. Electricity Prices and Tariffs

Residential electricity tariffs are lower in Bulgaria than in many of the other countries in the region. The residential tariffs were raised ten percent in 2001 to $.035/KWh. A conditionality in the World Bank's $450 million Programmatic Adjustment Loan (PAL) requires three more tariff increases amounting to a 45 to 50 percent increase over the next three years. The first of these increases came in July 2002. The daytime rate stayed the same for consumer using less than 75 KWh/month. Consumers using more than 75 KWh/month are now charged a higher rate. The same holds true for the nighttime rate if consumers use more than 50 KWh/month.

Maintaining the lower tariff for lower consumption is tantamount to the establishment of a social tariff. Consumers who are able to limit their electricity consumption and stay within the social tariff block are paying below-market rates and must, thus, be cross-subsidized by consumers who use more electricity and pay the higher tariff. The World Bank has reservations about such a tariff because it believes the tariff doesn't target the poor very well, but the Bank did not oppose it. However, the Bank considers the social tariff to be a temporary measure that will be abolished once the overall price adjustments are completed in the 2004-2005 timeframe.

There is disagreement about whether low-income households are hard hit by the tariff increase. The Confederation of Independent Trade Unions claims that most low-income households will have difficulty keeping their daytime consumption within the 75 KWh/month and 50 KWh/month limits because just using a standard electric cooker consumes 81 KWh/month. The SERC states that only seven percent of the people will feel the price jump.[53]

The social tariff and the residential tariff generally are cross-subsidized by the industrial sector tariff. That is, the tariff charged to industrial users is higher than the cost of supplying electricity to them; the higher price then allows the electricity companies to lower the prices charged to residential users, while still charging enough to cover companies' total costs. Cross subsidies, like subsidies in general, are generally frowned upon by economists as distorting markets. The economists maintain that social assistance to help the poor should be provided as a discreet form of government assistance instead of being incorporated in tariff cross-subsidies. A study comparing electricity tariffs among a group of countries noted that Bulgaria was the only one that had cross-subsidies (see figure 5-1). This is despite the fact that cross-subsidies are contrary to official Bulgarian policy. Article 16 of the *Energy and Energy Efficiency Act* requires that the SERC prohibit cross-subsidization of consumers and producers.[54]

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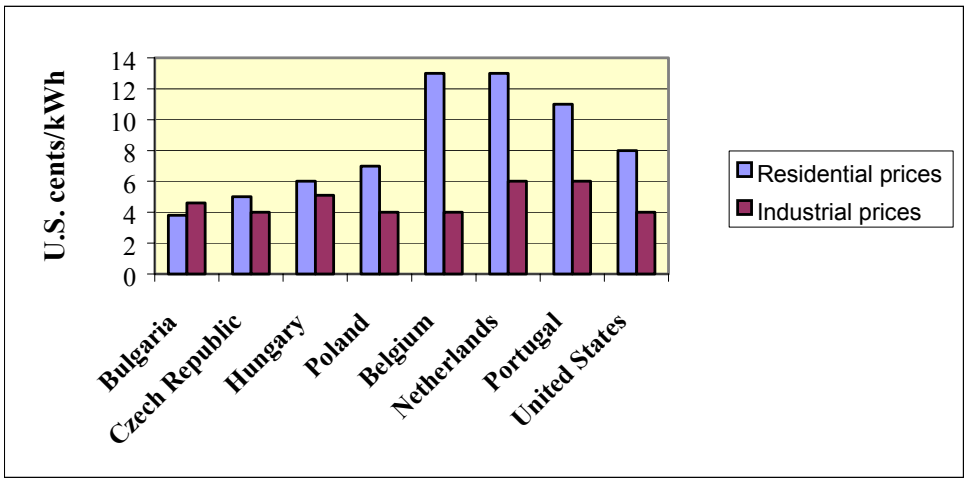
[53] Evdokia Dimitrova and M. Arabadzhieva, "Trade Unions Firmly Against Electricity Price Increase," *Bulgarian Economic Review Fortnightly* (June 13, 2002), available via the Internet at: http://www.news.pari.bg/cgi-bin/ber.home.cgi.

[54] Energy Charter Secretariat, p. 13.

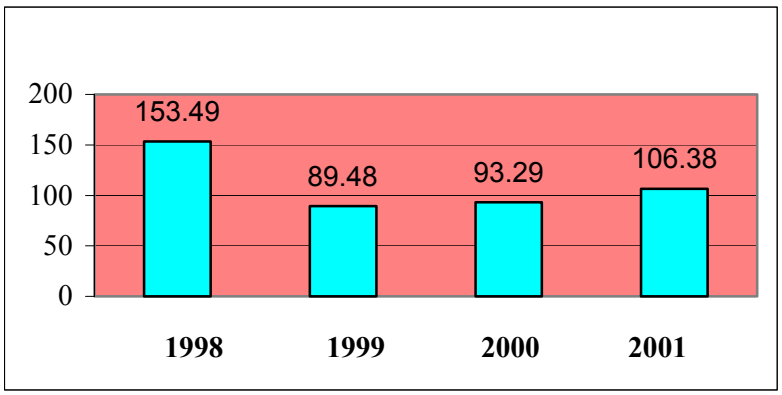
The World Bank quantified the electricity cross-subsidy to households (see figure 5-2). In 2001, the household subsidy was estimated at 106 million BGL ($40.4 million). With the July 2002 tariff increase, the subsidy will decline. According to SERC, it will drop to 44 million BGL ($21.35 million).

Figure 5-1: Electricity Prices for Residential and Industrial Customers in Bulgaria and Other Countries, 2000-2001



Source: Lazarova, 2002. Data on Bulgaria is from SERC's *February 4, 2002 Resolution* adopting new tariffs for electricity, heating and natural gas; data from other countries is from IEA's *Key World Energy Statistics*, 2001.

Figure 5-2: Household Electricity Subsidies (million BGL)



Source: The World Bank, "Bulgaria: Public Expenditure Issues and Directions for Reform."

B. Non-Electric Energy Prices and Tariffs

Prior to the introduction of autonomous household-level metering and controls for district heating, payments were based on the cubic meters of heated space. Many households still pay on this basis, but the legal requirement to fit HCAs is rapidly

increasing the number of households that bay on the basis of their own heat consumption.

The residential district heat tariff is a fixed price that the government subsidizes. In January 2000, the fixed price for households was raised 12 percent to 36.41 BGL/ MWh. ($17.09/MWh). It was raised again in October 2001 by another ten percent. The Council of Ministers sets the ceiling price for the district heating systems receiving state subsidies. In May 2002, *Ordinance 141* established a two-tier heat tariff for district heating companies receiving state subsidies:

- Consumption up to 250 KWh/monthly: BGL 34.05 /MWh ($15.98) including VAT.
- Consumption above 250 KWh/monthly: BGL 37.94 /MWh ($17.80) including VAT.

The typical household consumes about 5,500 KWh (5.5 MWh) equivalent per heating season. It thus pays BGL 17.80 /MWH x 5.5 MWh = $97.90.

In addition, households in Sofia must pay a flat capacity charge of $0.022/cubic meter of heating space per month over the full year.[55] As the typical apartment is 70 to 75 square meters, multiplied by an average height of 2.5 m = 187.5 cubic meters, the household pays $.022/cubic meter x 187.8 cubic meters x = $4.13 per month (or $49.58/year).

The smallest apartment in panel buildings (one room and a kitchen) has an area of 40 to 47 square meters, or 117 cubic meters, so the household would pay $0.022/cubic meter x 117 cubic meters = $2.57 per month (or $30.89/year), regardless of the quantity of heat consumed. In sum, the average annual heating bill for a typical Sofia apartment is:

$97.90 commodity charge + $49.58 capacity charge = $147.48

For the smallest Sofia apartment, assuming it consumes proportionately less heat than the typical apartment, its average annual heating bill is:

$61.09 commodity charge + $30.89 capacity charge = $91.98

Some households will be able to reduce their bills by consuming less than 250 KWh/month and thus paying at the lower tariff level, particularly during the warmer heating months. They may also be able to reduce the bills through energy conserving behavior and the installation of energy-efficiency measures.[56]

However, heating bills will rise over the near term because the national policy is to raise heating tariffs. According to the national strategy:

> In 2002-2005, increases in heat prices for household purposes are to be carried out, thus making it possible to phase out the subsidies for

[55]The World Bank's PAL recommended that district heating systems adopt the capacity charges.

[56] Note that, since the capacity charge is fixed, it will become a greater proportion of the total heating bill as a household institutes energy-efficiency measures. If and when it becomes a significant portion of the total bill, there could be political greater pressure on the district heating company to reduce it.

> generators by the end of the period. This will be achieved through annual increases.[57]

Annual increases are estimated to be approximately ten percent per year.

In 2000, as a way to reduce the impact of high heating bills, consumers in Sofia were offered the opportunity to pay part of the winter cost during the summer, thereby, smoothing out the payments and making them more affordable. So far, only 570 of the system's 350,000 customers, (or 0.16%), participate in this program.[58]

[57] Government of Bulgaria, *Energy Strategy of Bulgaria* (Sofia, March 2002), 19.

[58] *The Standard Daily* (Sofia, June 4, 2003).

Chapter 6
Financing the Energy Social Safety Net

Source of Funds:

- **For Assistance Payments:** The national government funds the WSP through the Ministry of Labor and Social Policy.
- **For Energy Efficiency:** There is currently no ongoing funding for low-income energy-efficiency improvements.

Sofia's Energy Efficiency Action Plan calls for the establishment of a $2.5 million Energy Efficiency Fund to finance measures in municipally owned buildings. It does not state where the funds would come from to capitalize the fund, but presumably, since the national government does not have funds of its own, a municipality would seek funding from the World Bank, EBRD, and bilateral donors. For residential buildings, the action plan estimates that a $31.5 million investment would be needed to implement basic energy-efficiency measures over three years and states that funding would come from bank loans to a new municipal agency, which would serve as an energy service company (ESCO), repaying the banks out of the energy savings that are generated by the energy-efficiency measures.

The United Bulgarian Bank provides loans for energy-efficiency projects in municipalities and private companies that are guaranteed with the USAID/DCA bank guarantee. The agreement for the UBB to provide credit to energy-efficiency projects was signed at the end of 1999 and will be in force for 11 years. The DCA facility has a guarantee ceiling of US$5 million, with a maximum loan portfolio ceiling of US$10 million. UBB provides credits at market conditions.

The UBB's lending conditions are as follows:

- **Interest rate** = Base Rate of UBB + 6%.
- **Guarantees** can be real estate, deposits in BGL or foreign currency, or state securities. As a rule, the collateral considerably exceeds the loan principal amount. The security margin depends on the loan amount and terms of repayment. In general, the required loan collateral should be equal to 100% of the principal.
- **Repayment period**: The short-term nature of crediting in Bulgaria acts as a considerable limitation to the use of credit resources. However, credits are being extended to 2010 to the end of the facility's guarantee period.
- **Grace period**: In accordance with the current practice, a grace period up to 1 year could be negotiated.

In 2002, the First East International Bank provided a BGL 1.2 million loan (65% of project value) to a public-private partnership project for the construction of a combined heat and power (CHP) plant in the Stamboliiski municipality. The CHP plant will supply municipal and residential buildings with heat and will sell electricity to the grid. The loan conditions are quite favorable; the interest rate is 12 percent, there is a six-month grace

period, and a four-year repayment period. The loan has been negotiated on full market conditions.[59]

The existing environment protection funds in Bulgaria do not include energy efficiency among their priorities, and the National Energy Efficiency Fund briefly opened and then closed in 1999. Bulgarian municipalities can apply for funds (grants or interest-free loans) from the National Fund for Environment Protection and from the National Trust Ecofund. The National Fund for Environment Protection, which is under the Ministry of Environment and Water, provides grants, interest-free loans, and interest subsidies. The National Trust Ecofund manages funds arising mainly from the proceeds of a debt-for-nature swap between Bulgaria and Switzerland. The Ecofund provides both grants and loans.[60]

A National Energy Efficiency Fund was established in Bulgaria in 1998 with the assistance of the PHARE Programme; however, this fund had to be abolished in 1999 because of non-compliance with the IMF agreement concluded at that time. In 1997, under the PHARE Program and in a joint effort with KWI of Austria and ISD Bulgaria Ltd., the Assistance to the National Energy Efficiency Fund Project was developed. Its objective was to design the structure and management mechanisms of the Energy Efficiency Fund on the basis of the existing legislation. The project designed the required documents with respect to project management, reporting, and evaluation. Through the end of December 1999, the fund financed four demonstration projects. After that, it was abolished, together with other special funds and extra-budgetary accounts in compliance with an IMF request regarding special funds.[61]

The SAVE II Action Plan proposes the establishment of a new National Energy Efficiency Fund with a budget of approximately 100 million BGL/year ($48.54), which would operate as a revolving fund, providing medium- and long-term soft loans for bankable energy-efficiency projects. Chapter 4 of the draft *Law of Energy Efficiency* foresees the establishment of a fund for energy efficiency and renewable energy sources. The World Bank is currently (mid-2003) helping design a new energy-efficiency fund.

1. Source of Funds for Social Tariffs: Traditionally, residential tariffs have been cross-subsidized by the industrial sector. The cross-subsidy is gradually being reduced as residential tariff increases are being phased in. There has not yet been a decision on how to pay for the social tariff. In most countries, residential ratepayers in high-consumption classes pay a cross-subsidy to the low-consumption classes. Such an approach not only assists low-income families, but also encourages energy efficiency.

[59] Dimitar Dukov, December 2002.

[60] Silvia Lazarova, Central European University, "What's wrong with energy efficiency? - A comparative analysis of the barriers to municipal investments in energy efficiency in Bulgaria, the Former Yugoslav Republic of Macedonia and Hungary" (Budapest, December 2002 *draft*), 12.

[61] *Law of State Budget for 1999*, Annex 5, Item 54, S.G. 155, December 29, 1998.

2. Source of Funds for Metering and Controls: Households may finance HCAs and TRVs on installment plans that are funded by supplier credits, as discussed in chapter 3. According to the SEEA, some district heating companies are financing the HCAs and TRVs on a shared savings basis, wherein users pay for the equipment out of the savings on their heating bills.

Chapter 7
Analysis and Recommendations

Analysis: There is poor coverage of Bulgaria's social assistance and the government provides a low payment level. Taking social spending as a whole (including pensions and unemployment), most cash payments go to the non-poor.

The restructuring of Bulgaria's energy sector necessarily involves raising residential energy prices to economic levels. This will harm low-income households if no steps are taken to protect them. It will likely cause households to default on payments, increase arrears to utilities, or lead to increased disconnection rates. The Government of Bulgaria, thus, has a unique opportunity to reform the policies and mechanisms by which it provides energy assistance to low-income households. A restructuring of energy assistance can and should occur concurrently with overall sector restructuring.

Currently, the three approaches for assisting low-income households with their energy costs— social tariffs, heating assistance payments, and household energy efficiency— are the responsibilities of three different agencies. SERC is in charge of tariffs; MLSP is in charge of the WSP; and the SEEA within MEER is in charge of energy efficiency. Yet helping low-income households in an administratively efficient manner must involve coordination among these three agencies.

Recommendation: At a minimum, an inter-agency task force is needed to coordinate the efforts of the three agencies. The MEER does not yet have an energy-efficiency program that targets low-income households, but the task force would help set the stage for such a program, helping the agency appraise such concerns as eligibility, targeting, and supervision that the WSP has already faced.

Analysis: Of the three approaches to assisting low-income households, energy efficiency may be the most equitable and cost-efficient approach. This is because low-income energy-efficiency programs can be targeted to low-income households on a need basis, whereas social tariffs cannot, as they are often enjoyed by medium- and upper-income households instead of their intended beneficiaries. Low-income energy-efficiency programs are also less subject to the corruption that often pervades fuel assistance programs. This is because visual inspections can help determine whether a household is indeed in need of energy-efficiency measures, and post-installation inspections of can be done to confirm if the benefits actually went to the household, whereas fuel assistance payments can more easily end up in the hands of unintended beneficiaries. Another advantage of low-income energy-efficiency programs is that they only need to provide assistance to a household once, while both social tariffs and assistance payments are ongoing and thus require continuous cross-subsidies or government budget outlays. Finally, low-income energy-efficiency programs, like all energy-efficiency efforts, are good for the environment and help reduce fuel imports.

Recommendation: Bulgaria should establish a low-income energy-efficiency program. The program should be coordinated with the social tariffs and fuel assistance payments, which can be reduced over time as the energy-efficiency improvements reduce low-income household costs.

The low-income effort can be integrated into power sector restructuring in three ways:

1. Maintaining a social tariff even as other tariff categories are increased.
2. Establishing an energy "resource portfolio standard" requiring privatized distribution utilities to obtain a predetermined percentage of their energy resources through energy-efficiency, and a portion of that through low-income energy efficiency.
3. Establishing a "system benefit charge," whereby utilities collect an energy consumption levy that is used to capitalize an energy-efficiency investment fund or to support demand-side management programs.

The latter two approaches require utilities to take actions outside their core task of providing energy and may not necessarily be applicable in the Bulgarian setting. However, the heat metering companies' provision of HCA/TRV bundles to Bulgarian district heated households may serve as a precedent for Bulgarian utilities to be more proactive in providing energy-efficiency services, including financing. Also, the concept of energy surcharges, while not necessarily called "system benefits charges," are common throughout the world and are used to collect funds for a variety of purposes.

A. Low-Income Energy-Efficiency Assistance

To date, Bulgaria's energy-efficiency efforts in the residential sector have been minimal. It has adopted a policy, established an agency, and supported sporadic, donor-funded demonstration projects. With the forthcoming EBRD-administered KIDSF, Bulgaria will have a unique opportunity to establish a low-income energy-efficiency program to help pay for much needed energy-efficiency improvements in its residential building stock.

The program should be two-tiered to provide: a) free energy-improvements like window sealing and foil radiator sheets (as well as HCAs and TRVs); and b) low-cost long-term financing for common area improvements like basement, wall, and exterior wall insulation. For middle-income households, it should seek to allow energy-efficiency improvements to be financed through installment payments made on utility bills in the same way HCAs and TRVs are now being financed.

According to the 1999 SAVE II report, the Bulgarian government should set quantitative targets for end-use energy-efficiency improvement. This should include targets for the residential sector and for low-income apartments.

The SAVE II report recommends "energy labeling" for buildings, a practice used in most of the USA, (where it is known as an energy "rating"), as well as in Denmark, the U.K., Ireland, and Germany. Under this approach, all houses and flats are energy-labeled before sold. Energy labeling enables a potential buyer to assess the energy consumption of the house or apartment. An approved energy consultant must perform an analysis and provide the label. The energy label should include information about the property's annual energy consumption for heating and the environmental impact. The energy label evaluates the heating consumption on a scale from 1 to 5 (1 is the best) in comparison with average figures of comparable buildings. Establishing an energy-

labeling program in Bulgaria will not help low-income households in the near term. Rather it will, over time, help improve the energy efficiency of the overall residential building stock. Given the difficulty of housing rule enforcement in general, this recommendation may not be applicable to Bulgaria in the near-term.

But there are other ways to increase the energy efficiency of new construction. There is already an ordinance requiring new buildings to have wall insulation (either internal or external) installed and to meet a certain thermal standard (see chapter 4). But builders have not complied with the ordinance, and there is no enforcement effort on the part of the government. The government should begin enforcing the law in tandem with an effort to educate builders about how to comply with the law.

In addition, the government should eliminate the financial disincentives that currently exist with regard to residential energy-efficiency investments. Specifically, it should eliminate the three percent property tax increase on apartments or buildings that install wall insulation; eliminate the four percent property tax increase on apartments or buildings that install energy-efficient windows or frames; and eliminate the six percent property tax increase on apartments that install energy-efficient air conditioners.

The government should:

- Establish the legality of cooperative associations and give them standing to borrow for building improvements such as energy-efficiency measures. Both the Energy Efficiency Agency and the MLSP have expressed interest in this approach. District heating companies have also expressed interest because improving the energy efficiency of buildings will lower heating bills and concomitantly the size of assistance payments the heating companies must provide to low-income households.
- Provide incentives, such as partial guarantees, to ESCOs to enter into performance contracts with social agencies such as orphanages and municipal social service centers.
- Alternatively, establish a state-owned ESCO to enter into performance contract in high- risk/low-return sectors, such as the residential sector, that private ESCOs would not enter without significant incentives and/or guarantees.

Some low-income households may be able to afford small, low-interest, long-maturity loans. A loan program could be established as a component of the low-income energy-efficiency program, with the loan administration handled by municipalities or housing associations. The monthly payments would have to be very low and could perhaps be added to the utility bills during non-winter months.

B. Financing The Low-Income Energy-Efficiency Program

Budget transfers: One funding option for energy-efficiency programs is to transfer funds from the WSP budget. The transfers can be calibrated in such a way that households that would have received assistance payments will instead receive energy-efficiency improvements, thus reducing their need for the assistance payments.

Measures, such as window and door caulking and radiator sheets, which might cost $10 to install in a household, will typically reduce annual heating bills by more than $10. Thus, the energy-efficiency program's one-time $10 investment will allow for a $10 reduction in the fuel assistance payment that a household receives every year.

Energy-efficiency measures with greater than one-year payback are not so easily funded through WSP transfers. Interior wall insulation, for example, might cost $50 per household, but will only reduce annual household heating bills by $15. Thus, the government saves $15 in WSP outlays but must come up the additional $35 the first year to pay for the insulation. After that first year, the government will save $15 per year on that household through reduced fuel assistance payments.

Of course, the administrative costs of establishing and managing a low-income energy-efficiency program will increase the overall cost of household energy-efficiency improvements, so even the energy-efficiency measures with the quickest payback cannot be funded solely through WSP transfers. Additional funds will be needed for program design, administration, and monitoring.

Surcharge on energy sales: Many countries tax energy sales to pay for a socially desirable energy activity such as low-income energy-efficiency. If the surcharge revenues are dedicated to socially desirable activities (as opposed to going into the general government fund), then annual battles over government budget allocations could be avoided and the programs somewhat insulated from political pressures. The surcharge could be assessed on retail sales of electricity, metered or un-metered district heat, and natural gas. Administratively, it would be more difficult to assess the surcharge on sales of wood or charcoal briquettes, which perhaps should not be assessed in any event since poor households buy them disproportionately.

Special dedicated funds: The MoEW manages the national Environment Fund and the Municipal Environment Funds. These funds, which are capitalized by environmental and fuel consumption charges, could be used for energy-efficiency activities to support low-income energy-efficiency improvements. The establishment of an Energy Efficiency and Renewable Energy Fund was proposed in a 2001 amendment to the EEEA, but so far the fund has not been created. It is likely to be included in the new *Law on Energy Efficiency*. The SAVE II Action Plan also proposes the establishment of a National Energy Efficiency Fund, and as of mid-2003, the World Bank was working on the establishment of such a fund. Although energy-efficiency funds are typically oriented toward industrial sector projects, a portion of them could be set aside for the residential sector, (although if their charge is to invest in projects with commercial returns, it will be difficult to find such projects in the residential sector, let alone in primarily low-income residential buildings).

Utility-sponsored, demand-side management (DSM) programs: In DSM programs, utilities provide support for improvements in the energy efficiency of energy use; these programs have been successful in some countries, and there may be scope for them in Bulgaria. A precedent for providing financing to energy users was set by the heat metering companies, which provide financing for the HCA/TRV bundles in households connected to the country's district heating systems. In some countries, utilities have

provided free or heavily subsidized energy-efficiency services because the cost to the utility of the resulting saved energy is less than the cost of buying new energy supplies. However, DSM programs are sometimes controversial when they provide free or heavily subsidized services, for example to low-income households, because other ratepayers object to having to pay higher tariffs to cross-subsidize those services. They argue that governments, not utility ratepayers, are the proper funders of low-income services. The energy-efficiency financing can be structured so that there is no cross-subsidy and the borrowers pay the full costs of financing, but that would increase costs on low-income households and decrease their participation in the energy-efficiency financing program.

Joint Implementation (JI): As an Annex B signatory to the *Kyoto Protocol*, Bulgaria is obligated to reduce its greenhouse gas emissions. In addition, the government has expressed support, and is eligible for, JI investments pursuant to the UNFCCC. Thus, foreign carbon investors could help support energy-efficiency investments, including energy-efficiency improvements in low-income households. In exchange, the investors would take title to the carbon emission reductions. A JI unit and a project preparation facility have already been established within the MoEW to develop eligible JI projects, particularly energy-efficiency projects.

It should be noted that a low-income energy-efficiency program in Bulgaria would be competing for carbon investors with a range of other energy-efficiency investments and other greenhouse gas reduction projects both within and outside Bulgaria. At the moment, there are far more suppliers than there are buyers, and, thus, the price per ton of emissions reduction is quite low. In fact, it is unlikely that JI investors will ever be able to cover the full costs, or even most of the costs, of a low-income energy-efficiency program, but they could help. JI investors might be particularly attracted if their funds leverage other funds, thereby increasing the total size of the investment and increasing the number of emission reductions their investment yields.

Residential ESCOs: ESCOs have been successful in Bulgaria and other countries in addressing energy efficiency in institutional buildings and, to a lesser extent, in industrial facilities. The residential sector is more difficult because the energy savings—and thus the financial returns to the ESCO—are smaller. Also, because of the absence of cooperative associations, an ESCO must deal with each household separately, thereby driving up its fixed costs. And that assumes the household has the ability to pay for energy-efficiency services. Low-income households do not typically have the ability to pay for such services.

A major difficulty ESCOs face in any country is raising working capital. With no assets of their own and uncertain returns on their operations, ESCOs are viewed by public and private lenders as high-risk ventures. This problem is exacerbated for ESCOs working in the low-margin residential sector. One remedy would be to use grant funds from the KIDSF or a donor, such as the GEF, to provide partial guarantees to lenders for ESCO loans. Having the guarantees in hand would reduce lenders' risk in providing credit to the ESCOs.

KIDSF: In exchange for Bulgaria closing four reactors at the six-unit Kozloduy nuclear power plant, the EU and other donors will capitalize the KIDSF, a grant fund to be used

by Bulgaria for nuclear plant decommissioning and related activities, as well as for improvements in energy efficiency. The proceeds could be used to support energy efficiency through any of the mechanisms discussed in this section.

C. Assistance Payments

Recommendations:

- Increase the size of WSP payments for households that have not yet benefited from a yet-to-be-established, low-income, energy-efficiency program.
- Improve WSP reporting and accounting to ensure that only eligible households receive their bill credits or payments.

D. Tariffs

A social tariff is a highly inexact way to target the poor. It is only applicable to energy sources, such as electricity or district heat that are supplied over a network. It is not applicable to coal or wood, whose price may vary transaction to transaction. If the poor lack network access, then the non-poor will capture the bulk of network- or tariff-based subsidies. Thus, subsidies for non-network fuels like coal and wood may result in better poverty targeting.[62]

Even within the set of networked ratepayers, a social tariff does not benefit only the poor. Many middle-income households use little energy and thus qualify for the social tariff.

With these two caveats in mind, it is still possible to make improvements in the design and application of Bulgaria's social tariff. A social tariff only provides relief to low-income households if the lowest consumption block has a reasonable limit. As of July 2002, the lowest tariff applies to consumption up to 75 KWh/month. But according to a critique by the Confederation of Independent Trade Unions, 75 KWh in not even enough to power an electric cooker, which consumes 81 KWh/month. The SERC may need to revisit this limit on the lowest block.

Recommendation: Reduce the size of the capacity charges relative to the commodity charges for district heating in Sofia. This will allow households to lower their heating bills by reducing heat consumption and give them an incentive to pursue energy-efficiency measures.

E. Fuel Substitution

Many households, including low-income households that use electricity for heating, will face higher heating costs as the government gradually raises electricity tariffs to their long-run marginal cost. Although the exact timing of these increases is in doubt, the

[62] Julian A. Lampietti and A.S. Meyer, "Coping With The Cold: Heating Strategies For ECA's Urban Poor" (The World Bank, Washington, D.C.), 1.

government will need to allow distribution and generation companies to cover the costs of providing electricity if it is to complete its objective of privatizing the companies.

Recommendation: With these higher electricity prices in mind, efforts should be made to not only improve the energy-efficiency of electrically-heated homes, but also to expand low-pressure natural gas networks and rehabilitate district heating systems to offer a more efficient, less expensive heating alternative to electricity. According to the World Bank's 2001 Bulgaria Energy-Environment Review, these alternatives can be provided at a fraction of the cost of building new electric power capacity. For example, over the next few years, the average electricity price for households is expected to rise to its economic cost of US$50-60/MWh. Compared with this, the economic cost of low pressure natural gas would be US$20-24/MWh (or $200/tcm) and district heating would be about US$25/MWh.

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Average Monthly Exchange Rates 1991 - 2001, BGL/USD

YEAR	JAN	FEBI	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Average for the year
1991		24.32	16.99	16.90	18.49	18.10	16.88	18.69	18.29	19.50	20.81	21.72	18.86
1992	23.63	23.71	23.62	23.00	23.11	23.10	22.91	22.45	22.29	23.09	24.37	24.80	23.34
1993	25.33	26.27	26.57	26.43	26.52	26.57	27.12	27.35	27.57	28.48	30.94	31.98	27.65
1994	35.68	37.00	47.20	55.32	55.58	54.36	53.68	55.07	61.32	64.06	65.10	65.53	54.25
1995	66.82	66.36	65.99	65.65	65.64	66.12	66.10	67.72	68.04	68.24	69.11	70.26	67.17
1996	72.53	74.59	77.94	81.55	119.53	143.10	180.14	191.79	224.60	224.30	283.39	461.16	175.82
1997	698.65	2387.16	1660.07	1546.23	1532.63	1668.45	1788.09	1844.23	1791.86	1759.19	1731.07	1774.81	1676.50
1998	1815.73	1814.92	1826.68	1818.23	1774.49	1790.64	1799.15	1789.03	1707.27	1638.95	1679.16	1670.07	1760.39
1999	1685.06	1745.31	1797.37	1828.55	1843.47	1884.73	1.88988	1.84470	1.86367	1.82697	1.89216	1.93489	1.83771
2000	1.92946	1.98901	2.02837	2.06805	2.15970	2.06077	2.08168	2.16358	2.24683	2.28799	2.28407	2.18061	2.124
2001	2.08480	2.12230	2.15127	2.19193	2.23394	2.29254	2.27299	2.17258	2.14128	2.15933	2.20198	2.19164	2.18479

Appendices

Appendix 1:

Organizations Interviewed in Sofia

The authors would like to thank the individuals from the following institutions who kindly contributed their time and expertise.

Danish Environmental Protection Agency

EBRD - Sofia

Electrotek

EnEffect

European Union - Delegation to Bulgaria

Ministry of Energy and Energy Resources

Ministry of Finance

Ministry of Labor and Social Policy

National Employment Service

Obeka 92

Orkikem

Sofena

Sofia District Heating Company

Sofia Municipality

State Energy Efficiency Agency

State Energy Regulatory Authority

Techem

UNDP - Sofia

USAID - Sofia

World Bank – Sofia

Appendix 2:

Monthly Social Assistance and Heating Assistance (WSP) Payment Amounts, January 2002 – March 2003

	Family type	Coefficient	GMI (Leva)	Differentiated GMI (Leva)	Coefficient through the heating season	DGMI for heating	BGL equivalent of 450 KWh WSP	Secured Income /lv./
1	A family of one	1.0	40.00	40.00	1.0	40.00	45.38	85.38
2	Living together person	0.9	40.00	36.00	0.9	36.00	45.38	81.38
3	A family of one over 70 years	1.2	40.00	48.00	1.5	60.00	45.38	105.38
4	A family of one invalid with over 90% disabled working efficiency	1.2	40.00	48.00	1.5	60.00	45.38	105.38
5	A family of one invalid	1.2	40.00	48.00	1.2	48.00	45.38	93.38
6	Living together person (invalid) with over 90% disabled working efficiency	1.2	40.00	48.00	1.5	60.00	45.38	105.38
7	Living together person (invalid)	1.2	40.00	48.00	1.2	48.00	45.38	93.38
8	A family of two	1.8	40.00	72.00	1.8	72.00	45.38	117.38
9	A family of two with an invalid with over 90% disabled working efficiency	2.1	40.00	84.00	2.4	96.00	45.38	141.38
10	A family of two with an invalid	2.1	40.00	84.00	2.1	84.00	45.38	129.38
11	A family of two (invalids) with 90% disabled working efficiency	2.4	40.00	96.00	3.0	120.00	45.38	165.38
12	A family of two invalids	2.4	40.00	96.00	2.4	96.00	45.38	141.38

	Family type	Coefficient	GMI (Leva)	Differentiated GMI (Leva)	Coefficient through the heating season	DGMI for heating	BGL equivalent of 450 KWh WSP	Secured Income /lv./
13	A parent with an orphan	2.4	40.00	96.00	2.7	108.00	45.38	153.38
14	Single parent with a child	2.1	40.00	84.00	2.7	108.00	45.38	153.38
15	A parent with a child-invalid	2.4	40.00	96.00	2.7	108.00	45.38	153.38
16	A parent with a non-attending school child (7-16 years old)	1.7	40.00	68.00	2.7	108.00	45.38	153.38
17	Single parent with non-attending school child (16-18 years old)	1.9	40.00	76.00	2.5	100.00	45.38	145.38
18	Invalid with over 90% disabled working efficiency with a child	2.1	40.00	84.00	3.0	120.00	45.38	165.38
19	Invalid with a child	2.1	40.00	84.00	2.7	108.00	45.38	153.38
20	A family of three with a child	2.7	40.00	108.00	3.3	132.00	45.38	177.38
21	A family of three with a child invalid	3.0	40.00	120.00	3.3	132.00	45.38	177.38
22	A family of three with a non-attending school child	2.3	40.00	92.00	3.3	132.00	45.38	177.38
23	Single parent with two children	3.0	40.00	120.00	4.2	168.00	45.38	213.38

	Family type	Coefficient	GMI (Leva)	Differentiated GMI (Leva)	Coefficient through the heating season	DGMI for heating	BGL equivalent of 450 KWh WSP	Secured Income /lv./
24	Single parent with an attending school child, and a non-attending school child	2.6	40.00	104.00	4.2	168.00	45.38	213.38
25	Single parent with two children (orphans)	3.6	40.00	144.00	4.2	168.00	45.38	213.38
26	A family of four with two children	3.6	40.00	144.00	4.8	192.00	45.38	237.38
27	Two parents with an attending school child, and a non-attending school child	3.2	40.00	128.00	4.8	192.00	45.38	237.38
28	Two parents with 2 non-attending school children	2.8	40.00	112.00	4.8	192.00	45.38	237.38
29	Single parent with three children	3.9	40.00	156.00	5.7	228.00	45.38	273.38
30	Single parent with 2 attending school, 1 non-attending school children	3.5	40.00	140.00	5.7	228.00	45.38	273.38
31	Single parent with 1 attending school child and 2 non-attending school children	3.1	40.00	124.00	5.7	228.00	45.38	273.38

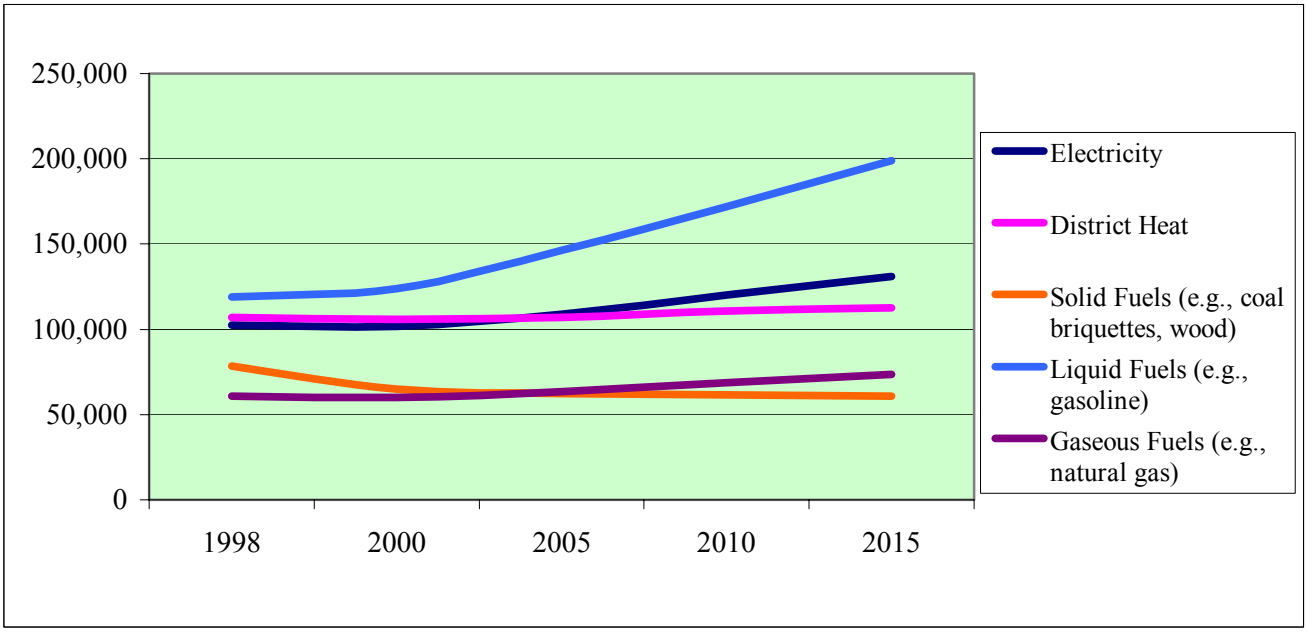
	Family type	Coefficient	GMI (Leva)	Differentiated GMI (Leva)	Coefficient through the heating season	DGMI for heating	BGL equivalent of 450 KWh WSP	Secured Income /lv./
32	Single parent with 3 non-attending school children	2.7	40.00	108.00	5.7	228.00	45.38	273.38
33	Single parent with 3 children (orphans)	4.8	40.00	192.00	5.7	228.00	45.38	273.38
34	A family of five with 3 children	4.5	40.00	180.00	6.3	252.00	45.38	297.38
35	Two parents with 2 attending school children and 1 non-attending school child	4.1	40.00	164.00	6.3	252.00	45.38	297.38
36	Two parents with 1 attending school child and 2 non-attending school children	3.7	40.00	148.00	6.3	252.00	45.38	297.38
37	Two parents with 3 non-attending school children	3.3	40.00	132.00	6.3	252.00	45.38	297.38
38	Single parent with four children	4.8	40.00	192.00	7.2	288.00	45.38	333.38
39	Single parent with 3 attending school children and 1 non-attending school child	4.4	40.00	176.00	7.2	288.00	45.38	333.38
40	Single parent with 2 attending school children and 2 non-attending school children	4.0	40.00	160.00	7.2	288.00	45.38	333.38

	Family type	Coefficient	GMI (Leva)	Differentiated GMI (Leva)	Coefficient through the heating season	DGMI for heating	BGL equivalent of 450 KWh WSP	Secured Income /lv./
41	Single parent with 1 attending school child and 3 non-attending school children	3.6	40.00	144.00	7.2	288.00	45.38	333.38
42	Single parent with 4 non-attending school children	3.2	40.00	128.00	7.2	288.00	45.38	333.38
43	Single parent with 4 children (orphans)	6.0	40.00	240.00	7.2	288.00	45.38	333.38

Source: Ministry of Labor and Social Policy.

Appendix 3:

Outlook For Final Energy Consumption By Energy Source, 1998-2015, TJ



Source: Ministry of Labor and Social Policy.

Appendix 4:

Final Energy Consumption, Residential Sector By Energy Source

		1990	1996	1997	1998	1999
Total	Mtoe	3.030 *	2.622	2.140	2.364	2.177
a. Electricity	Mtoe	0.901 *	0.988	0.850	0.906	0.870
b. Heat	Mtoe	0.988 *	0.665	0.621	0.591	0.584
c. Oil Products	Mtoe	0.428 *	0.242	0.008	0.014	0.019
d. Gas	Mtoe		-	-	-	-
e. Coal	Mtoe	0.803 *	0.556	0.482	0.495	0.346
f. Comb. Renewables and Wastes	Mtoe	0.356 *	0.171	0.180	0.357	0.358

Source: "OECD - IEA Statistics, Energy Balances of Non-OECD Countries, 1998-1999; 1997-1998; 1996-1997", several editions.

* Data from the Energy Charter Secretariat from SEEA

Appendix 5:

Social Protection Component Of Bulgaria's National Energy Strategy

Section IV (8) Social protection

Taking into account the key role played by social protection in the successful implementation of the reforms in the energy sector, a system for social protection of consumers will be put in place. This system will:

- Provide those in need with timely and sufficient energy subsidies
- Have a broader scope than the existing system and that scope will change flexibly depending on the income and price levels
- Be based on up-to-date schemes: individual vouchers, two-component tariffs, energy saving measures, consumption restrictors etc., which will simplify the provision of assistance and improve its efficiency

Equally important is the social protection of those employed in the energy sector. This protection will evolve along the following lines:

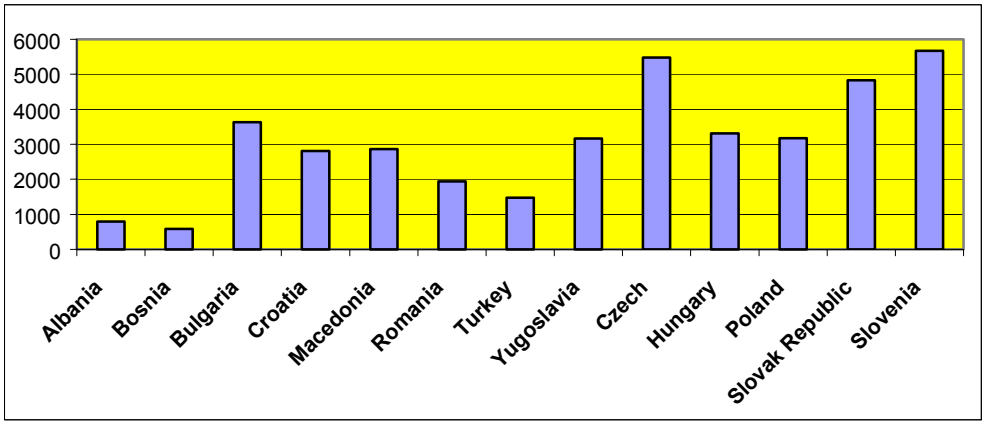
- Retraining program consistent with the requirements for market-oriented development of the energy sector, thus preventing lay-offs facilitating the process of reforms
- Programs for alternative employment and schemes for financial assistance to the workers and employees who are laid-off as a result of restructuring

Source: Ministry of Energy and Energy Resources, "Energy Strategy of Bulgaria," 2002.

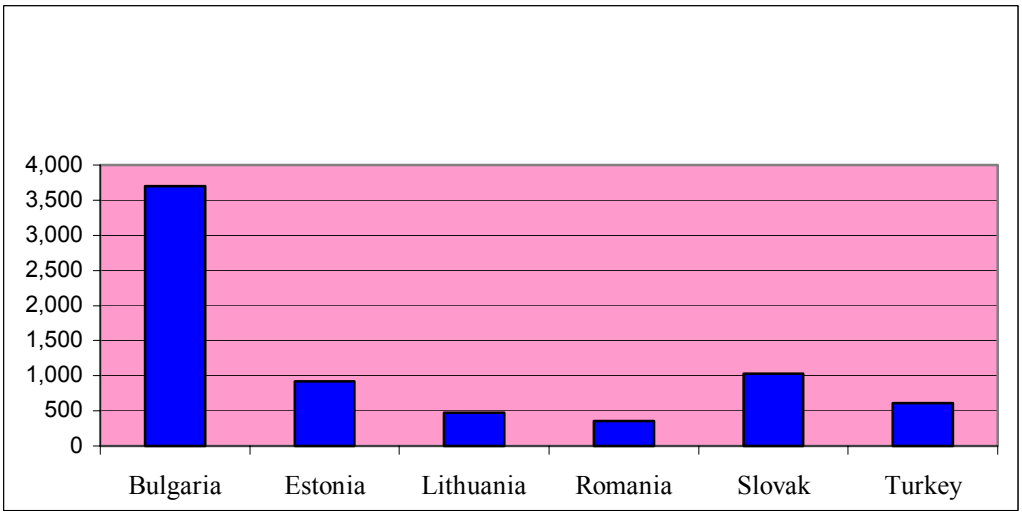
Appendix 6:

Electricity Consumption and Prices

Electricity Consumption Per Capita in Central and Eastern Europe, 1999 (KWh/Population)



Average electricity consumption per household, 1998 (KWh/household/year)



Source: The World Bank, "Bulgaria Energy-Environment Review," November 2001.

Average monthly household electricity prices, US cents/KWh

	1996	1997	1998	1999	2000	2001	2002	2003
Jan	3.0	3.9	4.2	4.7	4.7	4.5	4.4	6.7
Feb	3.0	3.8	4.2	4.6	4.7	4.5	4.4	6.7
Mar	3.0	3.7	4.2	4.7	4.7	4.6	4.4	6.8
Apr	3.5	3.7	4.2	4.7	4.7	4.6	4.5	6.9
May	3.4	3.6	4.2	4.6	4.7	4.5	4.7	7.1
Jun	3.4	3.4	4.2	4.6	4.6	4.5	5.0	
Jul	3.4	3.5	4.2	4.6	4.6	4.5	6.2	
Aug	3.3	3.5	4.2	4.6	4.6	4.5	6.2	
Sep	3.4	4.2	4.1	4.7	4.6	4.5	6.2	
Oct	3.4	4.2	4.1	4.8	4.6	4.5	6.2	
Nov	3.2	4.2	4.1	4.8	4.5	4.4	6.2	
Dec	3.2	4.2	4.1	4.8	4.5	4.4	6.5	

Retail district heating prices, 2002

Consumption up to 250 KWh/monthly: BGL 34.05 /MWh ($15.98) including VAT

Consumption above 250 KWh/monthly: BGL 37.94 /MWh ($17.80) including VAT

Appendix 7:

Sample Contract for Installation of Heat Cost Allocators and Thermostatic Radiator Valves

CONTRACT

Techem Services Ltd, 1113 Sofia, 20 F.J. Kuri Street, tax number 1227070850, represented by the manager Roumen Michailov called CONTRACTOR and _____.

Floor property with address: town ……., street called CONTRACTING AUTHORITY:

1……..ЕГН…….л.к.№

изд на ……г. от …….РУ, Tel.

2. ……..ЕГН…….л.к.№

изд на ……г. от …….РУ, Tel.

3. ……..ЕГН…….л.к.№

изд на ……г. от …….РУ, Tel.

Authorised by the fool property with PROTOCOL of the floor property at the meeting of the floor property held on_____ represented in an appendix to the contract,

1. Subject of the Contract

1.1 The Contracting Authority orders, and the Contractor agrees:

- Supply and install thermostat valve, thermostat heads and indicator for distribution of heat energy consumption;
- Completes of individual metering of the consumption of heat energy and distribution of costs for heat energy and hot water (in accordance with the heat distribution system Heidstek for distribution of heat energy costs and the company Techem) including provision of common and individual accounts

1.2 It is duty of the Contracting Authority to pay for the activities performed by the Contractor in accordance with the conditions of the present contract.

2. General Condition

2.1 Prepare a common and individual bills of consumers will be made on the basis of the actually consumed heat energy accounted and invoiced by Toplofikatzija (District Heating Company Sofia).

2.2 Individual heat energy consumption is established on the basis of the system Heidstek on the basis of the indications given by the equipment and the share of the

heat energy of the main pipelines of the common building installations in a share …….%/……..%.

2.3 The report on the use of heat and hot water is prepared once a year.

2.4 First account period is from……., to……

2.5 The present contract is concluded for a period of ……..year. The present contract could be prolonged automatically with one more year in case of not being terminated in written notice given a month before the expiry period of the contract.

3. Rights and obligations of Contractor

3.1 The Contractor is bound to supply and install necessary heat appliances for regulation and reading consumption heat energy consumption.

3.2 The Contractor is bound to announce the date of the installation of heat appliance in advance by an announcement on the entrance of the block.

3.3 The Contractor is bound to read the indicators of the individual water meters for hot water and the heat allocators at the end of heating season.

3.4 The Contractor is bound to install and maintain in its programme a constant data base about the consumer, its number, heat volume of the flat, number of people in the household, number and technical parameters of the heating devices, etc.

3.5 The Contractor makes and provides to the Contracting Authority a common and individual equalizing bill for the heat consumed within 45 days after the information has been obtained from Toplofikatzija …….... for the indications of the common heat meter for the reported period.

3.6 In case of damages proved for the Contracting Authority as a result of non-execution of contract obligations made by the Contractor, the Contractor is indebted compensation.

3.7 The Contractor has the right to sub-contract for the activities related to installation, maintenance, reading of appliances and cash on payments the company "Oveka" - 92 OOD. The Contractor is responsible for the activities performed by the subcontractor as if these are Contractors' activities.

4. Rights and obligations of Contracting authority

4.1 The Contracting authority is obliged to pay the value of the appliances, the installation and on year subscription in the day of installation. In cases of 12 months on installments payment the first installment is made in accordance with appendix 2 to the present contract in the day of the installation. The rest installments are paid cash in the offices of the company of by a payment order to account № 1000233116- Raiffiezen bank – Bulgaria

4.2 The Contracting authority is obliged to ensure an access to the premises of the authorised by the Contractor persons, so that the installation is performed.

4.3 The Contracting Authority is obliged to immediately inform the Contractor in case of change in the property, or user, as well as in case of changes in the number of heating devices in the flat.

4.4 When appliances for reading and regulation of heat power energy consumption are damaged the Contracting Authority is obliged to immediately inform the Contractor.

4.5 The Contracting authority is obliged to immediately provide the necessary data as per p. 3.4 to the Contractor.

4.7 The Contracting Authority has no rights for claims in case of not providing access to the premises or intentional damaged equipment.

5. Prices and terms of payment

5.1 The Contracting Authority is obliged to pay the price for the delivery, installation of the measuring equipment, and the subscription as per the conditions in appendix 2.

5.2 The subscription price for reading the heat cost allocators, hot water meters, the maintenance of installing appliances and preparing of common and individual bills are 4,20 BGL for a measuring device.

5.3 The price mentioned above shall be paid in the day of the installation, and for the next periods in the agreed terms - in the day of the annual accounting of the indicators.

5.4 In that the consumer despite of being informed, do not provide an access he/she will have to pay for additional visit the price of 2,10 BGL per heating device. A next visit is not performed. In case of no access provided the costs of the heat energy consumed for hot water and heating are calculated in the basis of the cubic meters of the flat heated/installed capacity of the premises and the number of persons living there.

5.5 If is necessary to change the data in the system for reading and calculating, or in case of change of ownership of premises, change in numbers of heating appliance and etc., both parties have to establish an individual scheme for visits. The price of the intermediate reading and calculation is 2,10 BGL for each metering device.

5.6 All prices in this contract could be re-examined in case of a change of the exchange rate of the Bulgarian National Bank 1 BGL for 1 DEM.

5.7 In all prices given above are with VAT 20% included.

6. Guarantees

6.1 The Contractor provides the following guarantees for the installed equipment:

a) for indicators for distribution of heat energy consumption - the electronic principle scheme – 2 years for the electronic part of appliance and 10 years for battery of appliance.

b) for indicators for distribution of heat energy consumption - the evaporator principle scheme – 5 years.

c) For thermostat valve produced by company: Rosvainer, Hertz & Huniuel - 2 years.

d) For thermostat valve produced by company Danfos – 3 years.

6.2 The Contractor provides the guarantees on the previous paragraph only in cases when the installation of the equipment has been made by the Contractor or by authorised by him company.

6.3 The term of guarantee starts from date of installation of the equipment

6.4 The Contractor is not responsible for damages after mechanical influence on equipment.

7. Others

7.1 This contract becomes effective after the information from "Toplofokatzia" has been provided to the Contractor for the possibility to start distribution of heat energy consumption.

7.2 This contract can be terminated before the expiry date only in case that one of the party has not performed the contractual obligations. The termination of the contract will be made by one-month notice. In case of termination of the contract before the expiry period the Contracting Authority has to fulfill its obligations for the calculation period.

7.3 In case that the contract is terminated by the Contracting Authority before the deadline of the contract the Contracting Authority has to pay the amounts due per paragraph 4.1.

7.4 When delays of payment are observed the Contracting Authority has to pay to the Contractor the interest as per Art. 86 of the Law for Contracts of Obligations.

7.5 All risks connected to the ownership of the appliances are on behalf of the Contractor by the transfer of property.

7.6 All devices remain possession of the Contractor by the final payment of the Contracting Authority.

7.7 The Contractor reserves its the right to perform an effective control on the conditions of the equipment.

7.8 Both sides will decide on all arguments of the contract in mutual understanding in case of not reaching an agreement this shall be in accordance with the provisions of the Law in Bulgaria.

7.9 For certain questions of the contract which have not been established under the contract the Bulgarian legislation applies.

7.10 All changes and additions to this contract are done in written form.

This contract is prepared and singed in duplicate – one by each party concerned.

Appendixes

1. Protocol from the meeting of floor owners

2. Offer and Payment Schedule by the Contractor

Appendix 8:

The State of Energy Sector Reforms and Privatization in Bulgaria

Bulgaria is in the midst of restructuring and privatizing its energy sector and raising energy prices to economic levels. Plans call for the privatization of electric power distribution, followed by the privatization of power generation. There are also plans to privatize the district heating systems and coal mining operations. Natural gas distribution is already in private hands. Both power transmission and gas import and transmission will remain government-owned for the foreseeable future.

Energy sector reforms are coming, but sporadically and more slowly than anticipated. The World Bank has expressed concern that, unless uncertainty is reduced and policy reforms are implemented, privatization of the energy infrastructure will not take place without costly government guarantees.[1]

The main guiding document for the Bulgarian energy sector is the "Energy Strategy of Bulgaria," which the Parliament approved in 2002 (*SG 7, 23.07.2002*). The strategy sets long-term goals, which include a reliable energy supply, energy efficiency, environmental protection, and nuclear safety. According to the strategy, the means to achieve these goals are legislative conformity with the EU energy legislation, market orientation, competition, and privatization.

A 1998 version of the strategy was the basis for the *Energy and Energy Efficiency Act* (EEEA), enacted in 1999 and amended in December 2000. The EEEA was intended to establish the institutional and regulatory structures for achieving the strategy's energy goals. However, it has achieved mixed results to date. State control still pervades most of the energy sector, particularly with regard to new investment. The regulatory authority, the State Energy Regulatory Commission, established in 1999, is not clearly independent of the Ministry for Energy and Energy Resources (MEER). The EU's 2001 pre-accession report on Bulgaria notes that, "The restructuring of Bulgaria's energy sector has progressed at a very slow pace throughout 2001," and urges the government to increase its efforts to achieve compliance with EU standards, particularly with regard to "preparing for the internal energy market, security of supply, and energy efficiency."[2]

A. The Electricity Sector: Ownership and Characteristics

The EEEA detailed plans for a fundamental restructuring of the vertically integrated national electric power company, Natsionalna Elektricheska Kompania (National Electric Company or NEK). The plans were carried out in 2000, resulting in the creation of six generation companies, seven distribution companies, and a transmission company.

Privatization of the power distribution companies was planned for completion in 2003, followed in subsequent years by the privatization of all power generation and coal

[1] The World Bank, "Bulgaria Energy-Environment Review" (Washington, D.C., November 2001), 1.

[2] "Bulgaria – Adoption of the Community Acquis."

mining. The French bank, BNP Paribas, was selected to help coordinate privatization of the distribution companies, and, as of September 2002, 65 investors had expressed interest in purchasing them. Four or five of the interested parties are large international investors, including the Russian National Energy Company. According to the privatization strategy, 65 percent of the shares of the distribution companies will be available for sale to strategic investors, with the remaining shares later being floated on the capital market.[3]

One reason for the slow restructuring progress is the political difficulty associated with raising residential energy prices, which have traditionally been subsidized in Bulgaria. Residential tariffs were raised 10 percent in 2001 to $.035/KWh, but according to the World Bank, they must be raised an additional 45 to 50 percent over the next three years. The most recent tariff increase went into effect in July 2002.

There is substantial political opposition to raising household electricity tariffs and, in particular, the trade unions have opposed tariff increases on the grounds that the population cannot afford higher prices. A 2002 analysis by the investment bank J.P. Morgan foresees political discontent in response to tariff increases and other unpopular structural reforms.[4]

Another reason for the slow progress is that Bulgaria currently generates more electricity than it needs and is exporting electricity to Turkey, Greece, Yugoslavia, Macedonia, and Albania. In 2000, Bulgaria exported 5.6 billion KWh to its neighbors, earning over $105 million in the process.[5] In 2001, exports reached 6.7 billion KWh, with Turkey accounting for over half of that. Exports in 2002 reached 6.3 billion KWh.[6] However, Bulgaria has agreed with the EU that it will close four nuclear reactors at its six-unit Kozloduy nuclear power plant, leaving only the two reactors in operation. With the four reactors generating roughly 9 billion KWh, this will eliminate electricity exports and the earnings derived from them.[7] The prospect of the lost earnings has split the government and may continue to delay the closure of the final two of the four nuclear units.

Closure of the nuclear plants is important, as it will trigger the disbursement of an European Bank for Reconstruction and Development (EBRD)-managed and donor-capitalized grant fund, the Kozloduy International Decommissioning Support Fund (KIDSF), to be used for nuclear decommissioning, energy efficiency, and electric

[3] U.S. Department of Commerce, CEEBICnet (September 20, 2002), available on the Internet at: http://www.mac.doc.gov/ceebic/countryr/bulgaria/new.htm.

[4] "JP Morgan Sees Upheaval in Bulgaria's Industry, *Bulgarian Economic Review Fortnightly* (August 30, 2002), available on the Internet at: http://www.news.pari.bg/cgi-bin/ber.home.cgi,.

[5] U.S. Energy Information Administration, "Country Analysis Brief for Southwestern Europe" (Washington, D.C., November 2001), available on the Internet at: http://www.eia.doe.gov/emeu/cabs/seeurope.html.

[6] Milko Kovachev, Minister of Energy and Energy Resources, in a speech before the Southeast Europe Economic Forum, October 14-16, 2002, and Dimitar Dukov, EnEffect, Sofia, interview by the author, May 2003.

[7] The average load of the Kozloduy NPP is 59%. In one year, two reactors can generate 880 MW x 8760 hours x 0.59 = 4.5 billion KWh. Four reactors can generate 4.5 x 2 = 9 billion KWh.

metering. The specifics of the energy-efficiency component are yet to be determined, and there is disagreement about whether it will be limited to saving electricity in response to the lost nuclear capacity or whether non-electric energy-efficiency investments such as district heating improvements and weatherization could be included.

The KIDSF will have two components. The first, based on a two-year old framework agreement that the Bulgarian Parliament ratified in April 2002, is a 96 million Euro grant that will be provided in exchange for the closure of the first two nuclear units. Of the total, roughly 60 million Euros will be for nuclear unit decommissioning, spent fuel storage, and other related activities, and roughly 30 million Euro will be for energy efficiency. These totals may increase because the number of donors contributing to the fund has increased, and the 96 million Euros is now somewhere in the 112 to 120 million Euro range. The second KIDSF component will consist of 100 million Euros and will be provided in exchange for the closure of nuclear units 3 and 4. There are not yet any decisions on how this component will be spent.

B. Other Energy Sub-sectors: Ownership and Characteristics

1. District Heating

All major Bulgarian cities are served by district heating systems built between 1970 and 1990. MEER owns all but the Sofia system, which is majority owned by the Sofia municipality. The 21 district heating systems, predominantly fueled by natural gas, supply heat to over 570,000 households with more than 1.5 million individuals, amounting to 18 percent of the population. The Sofia district heating system supplies heat to over 350,000 households with 950,000 individuals, and accounts for 60 percent of Bulgaria's district heat consumption. Nationally, district heat accounted for 23 percent of the end-use energy balance in 1998, with a connected load of about 7,700 MW (thermal).

The district heating systems are in bad physical and economic condition for several reasons: lack of market conditions—metering, regulating equipment, and prices that reflect costs; outdated and obsolete equipment and facilities; consumers' insolvency (mainly residential and institutional users); and load decrease due to consumers' withdrawing from the system.[8]

Customer disconnections have been the result of the increasingly unaffordable district heat, particularly for the poor, due to the phasing out of district heating operating subsidies. Meanwhile, fuel assistance payments are inadequate and do not compensate for either the increasing poverty or decreasing subsidies. In the cities of Sofia and Pernik, which together account for 66 percent of all district-heated households, over 30

[8] *Bulgaria National Energy Strategy*, 2002.

percent of households have either partially or completely disconnected from the district heating systems.[9]

According to the EBRD, the Sofia system is the most energy-inefficient consumer in Bulgaria. The EBRD, World Bank, and bilateral donors are providing 86 million Euros for upgrading the Sofia system (30 million Euro EBRD loan, 26 million Euro World Bank loan, and 30 million Euro in donor grant funds). In addition, the United States Agency for International Development (USAID) via Nexant Inc. has conducted an assessment of converting the country's district heating systems to private concessions, including financing strategies and business plans.

The Bulgarian press and the Ministry of Finance are critical of the policy of continuing to provide government subsidies to the loss-making and inefficient district heating companies. This negative perception has carried over to the general public as well.

Despite the poor conditions of the systems and their negative public perception, the State Energy Efficiency Agency (SEEA) considers rehabilitating district heating to be cheaper and more efficient than any alternative. Upgrading and rehabilitating the systems will be much less expensive than upgrades to the power system that would be required if electric resistance heating were to displace district heat. According to SEEA, it would also be less expensive in most cases than constructing urban low-pressure, natural gas distribution networks, which would also require the additional cost of installing gas furnaces in all the buildings, although the relative costs would vary on a case-by-case basis.[10]

Government Plans

Privatization of the nation's district heating systems—other than the Sofia system—was scheduled to begin during mid-2002, but it may be difficult to attract interest in the many inefficient and debt-riddled systems in their current condition. On the other hand, there has been some preliminary interest in the purchase of the heat generation plants; Czech, Swiss, and Austrian companies all inspected and expressed interest in the Plovdiv district heating plant[11] in mid-2002.

The government has historically heavily subsidized district heating. The resulting below-market costs for home heating have benefited not only low-income households, but also all households. According to the EU's 2001 accession report for Bulgaria, the subsidies, while socially justifiable, should be eliminated while social assistance should be simultaneously restructured and directed to target groups of the population.[12] Subsidies to district heating companies have declined in recent years, from 70 million BGL

[9] Lampietti and Meyer.

[10] Michael Bulgarensky, Senior Expert, SEEA, interview with the author, April 2002.

[11] "Foreign Investors Eye Plovdiv District Heating," *Bulgarian Chamber of Commerce News* (August 22, 2002), available on the Internet at: http://www.bcci.bg/analytica/.

[12] European Union, "Pre-Accession Economic Programme: Bulgaria" (Brussels, May 2001), 42.

($32.86) in 2000 to 55 million BGL ($25.11) in 2001 to an estimated 40 million in 2002. The government is scheduled to phase out the subsidies in 2005.

Non-payment is a major problem with district heat. If a household does not pay its heating bill, the district heating company can initiate legal procedures against the debtor and win a court decision. If the customer does not have any other sources of income, an executive procedure of the court can be initiated, and the debtor can have assets confiscated. To date, the law has not been widely enforced and no confiscation has occurred, largely for political appearance reasons. Where there are court actions, the process is slow and the resulting collections are small. In some cases, entire apartment buildings have been disconnected from district heat when a certain number of households have not paid their heating bills. This has not happened in Sofia.

Rehabilitating the district heating systems is a major government priority. Substations are being modernized and system losses reduced with financial support from the World Bank and EBRD. In addition, heat cost allocators (HCAs) and thermostatic radiator valves (TRVs) have been installed on almost all radiators (see chapter 4), so that heat consumption can be metered and controlled autonomously by households. The government hopes the unaffordable/non-payment/disconnection problem will be eased as the result of the meter and valve installation because households will be able to adjust (decrease) their heat consumption, which will lower the heating bills.

2. Natural Gas

There is an ongoing expansion of the natural gas distribution network, although the gas is being used almost exclusively in power generation, district heat generation, and industry, not in the residential sector. There are only about 3,000 residential gas customers in all of Bulgaria (concentrated in the cities of Sevivo, Pervomia, Lovich, and Montana) and this is not likely to increase much in the near term due to the high cost of installing low-pressure gas distribution networks in residential areas plus the cost of installing gas furnaces in apartment buildings.

Residential gas use could expand in the medium-term (5-10 years), as electricity tariffs increase as part of the power sector restructuring and privatization process and as four of Bulgaria's nuclear power units are shut down as part of the EU accession process. The higher electricity tariffs and the need for new energy sources to replace the lost nuclear capacity will make it cost competitive to expand the low-pressure natural gas network and to replace residential electric heating with gas heating. Studies are under way on how to develop residential gas distribution networks.[13] According to one estimate, it will cost $1.6 – 1.7 billion over 10 years to build the networks, and it will cost an average of 2,500 BGL ($1,214) to connect each household.[14] The French company, Sofregaz, an affiliate of Gaz de France, is establishing a joint venture to design and

[13] Catherine Connors and I. Traugott, "Bulgarian Energy Sector: Assessment," (Pierce Atwood, Portland: January 31, 2002), 11.

[14] Hristo Kolev, "Overgas Ready to Provide Blue Fuel For 1,800,000 Households," *Bulgarian Economic Review Fortnightly* (May 27, 2002), available on the Internet at: http://www.news.pari.bg/cgi-bin/ber.home.cgi.

build gas distribution networks in approximately 100 medium-sized Bulgarian towns. Financing from the EU PHARE Program will help launch the venture.[15]

The roughly 30 small gas distribution companies in Bulgaria are privately-owned and purchase gas from Bulgargaz, the state-owned gas importing and transmission company. Almost 100 percent of the gas comes via pipeline from Russia through the Ukraine, although there is a possibility that gas may flow from Iran in the future. Bulgargaz has take-or-pay contracts with Russia's Gazprom that gradually increase the amount of gas purchased in anticipation of expanded use of gas in the residential sector.[16]

3. Solid Fuels: Coal and Wood

There is still heavy reliance on coal briquettes for residential heating, although households are gradually shifting to other fuels, mainly electricity. The briquettes are used for heating and cooking by many low-income households, especially in rural areas, which account for one-third of the Bulgaria's population. Briquette use is particularly high in the vicinity of the state-owned briquette factory in the Stara Zagora region of central Bulgaria. Regulation of briquette prices was phased out in 2000. Prices have risen in recent years and were expected to reach cost-recovery levels in 2002. The government hoped that by letting the prices of coal briquettes rise to market levels, competition would prevail, which would encourage increased investment in coal mining, which has suffered from bankruptcies and mine closures. However, higher briquette prices may instead accelerate households switching to other heating fuels, primarily electricity and wood.

There is high wood consumption for heating and cooking, particularly in rural areas, but also in cities and towns other than Sofia. Reliable and consistent figures are not available, but annual household firewood consumption is reportedly about two million cubic meters/year. Although there are no national figures on how many households heat with wood, a study conducted under the EU PHARE Programme of the Lovetch region in Northern Bulgaria found that 81 percent of households use wood for heating. In particular, wood is displacing coal briquettes due to increasing coal briquette prices and limited household budgets. There is some local production of wood briquettes, which could well be a competitive fuel in the near future. Wood appears to be the only fuel whose price is not increasing under the government's energy restructuring program. Any increase in wood demand resulting from its relatively low price could be offset

[15] U.S. Department of Energy, available on the Internet at: http://www.fe.doe.gov/international/bulgover.html.

[16] Ibid., p. 11.

somewhat by rising transportation costs due to the need to transport the wood greater distances.[17]

[17] EVA - Austrian Energy Agency, "Small and Medium Scale Biomass-Boilers and Stove Manufacturers: Country Picture in Bulgaria & Romania" (2000), available on the Internet at: http://www.eva.ac.at/opet/bioboiler/bulrum_cp.htm.